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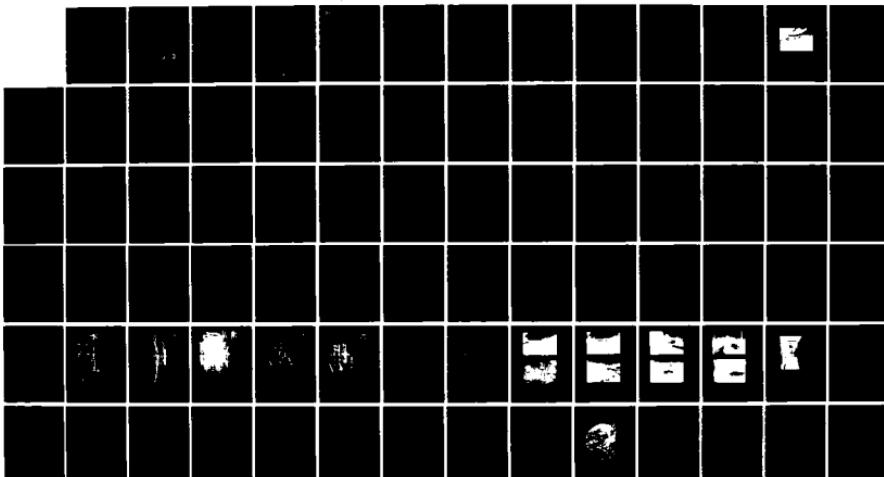
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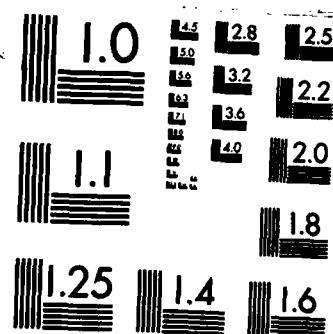
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AD-A154 653

HOUSATONIC RIVER BASIN
TYRINGHAM, MASSACHUSETTS

GOOSE POND DAM
MA 00312

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

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19. ABSTRACT (Continue on reverse side if necessary and identify by block number) - Goose Pond Dam is about 285 ft. long and 27 ft. high. The facility is considered in fair condition. Based on the intermediate size and high hazard potential, the flood test is the Probable Maximum Flood. Investigations are recommended to determine the stability of the embankment and the effect of seepage.		

GOOSE POND DAM
MA 03312

HOUSATONIC RIVER BASIN
TYRINGHAM MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED-E

SEP 29 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts

Dear Governor King:

Inclosed is a copy of the Goose Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the Goose Pond Dam would likely be exceeded by floods greater than 17 percent of the Probable Maximum Flood (PMF), the test flood for spillway adequacy. Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty (50) percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

NEDED-E

Honorable Edward J. King

I have approved the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the non-Federal Dam Inspection Program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. This report has also been furnished to the owner of the project, Westfield River Paper Co., Lee, Massachusetts.

Copies of this report will be made available to the public, upon request to this office, under the Freedom of Information Act, thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for the cooperation extended in carrying out this program.

Sincerely,



MAX B. SCHEIDER

Colonel, Corps of Engineers
Division Engineer

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Identification: MA 00312
Name of Dam: GOOSE POND DAM
Town: TYRINGHAM, MA
County and State: BERKSHIRE COUNTY, MA
Stream: GOOSE POND BROOK
Date of Inspection: 2 May, 1979

BRIEF ASSESSMENT

Goose Pond Dam is approximately 285 feet long and 27 feet high. The dam consists of an earth embankment with riprap at the upstream face and an inclined dry stone masonry wall at the toe of the downstream face. A gate house is present at the center of the dam along the front face of the crest. A rectangular concrete lined stone channel serving as the spillway is located at the left abutment of the dam.

The facility is considered in fair condition. Seepage was observed at three locations on the downstream slopes. Minor repairs are required in both the spillway and discharge channel.

Based on the size classification, intermediate, and hazard potential classification, high, in accordance with Corps of Engineers Guidelines, the spillway test flood is the Probable Maximum Flood (PMF). Hydrologic analysis indicates that the spillway capacity with the water surface at the top of dam is approximately 670 cfs, which is about 17 percent of the routed test flood outflow of 4,050 cfs. The estimated test flood stage is about 2.2 feet above the nominal top of dam.

Investigations are recommended to determine the stability of the embankment and the effect of seepage, to determine the spillway adequacy and overtopping potential and to determine structural corrective measures necessary to effect permanent repairs in the spillway. Recommended remedial measures include the reshaping of the crest, restoring riprap along portions of the upstream slope, stabilizing the raveling, inclusion of downstream areas in the cutting of grass, the cutting of brush overhanging the spillway, the replacement of loose patches in the spillway invert and side walls, and the resetting of stones in the spillway discharge channel. The Owner should develop a formal maintenance program, operational procedure, and emergency procedures plan and should institute a program of annual technical inspections. The remedial measures and recommendations should be performed within one year of receipt of this report by the Owner.

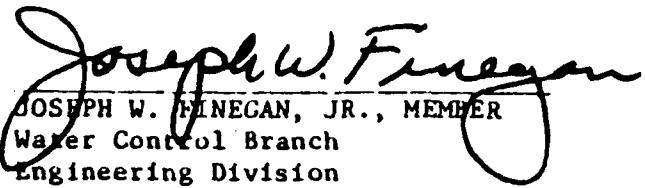
CAMP DRESSER & MCKEE INC.

Roger R. Wood

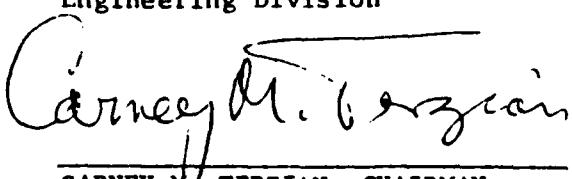
Roger H. Wood
Vice President



This Phase I Inspection Report on Goose Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division


JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division


CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:


JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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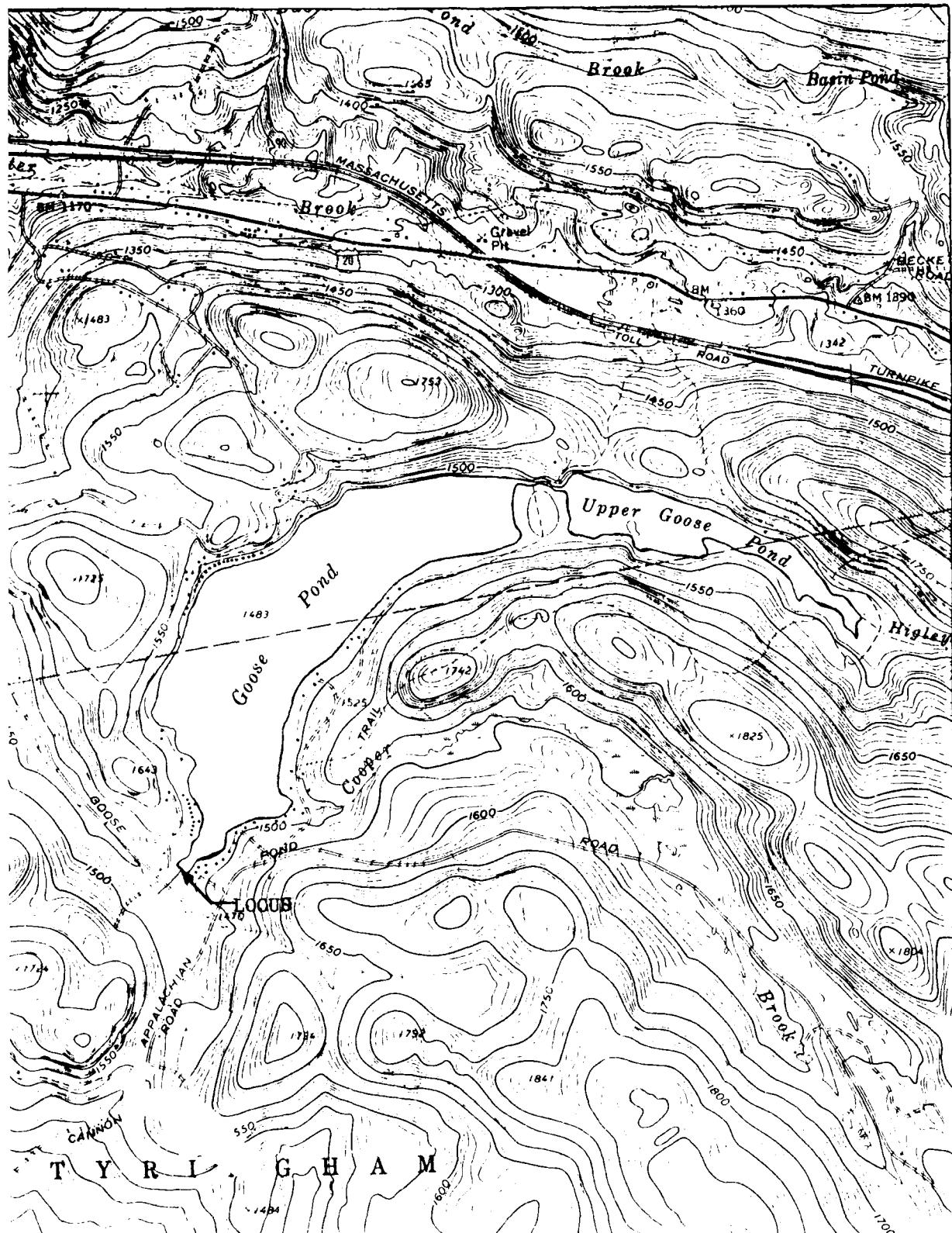
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1. OVERVIEW OF DAM FROM LEFT ABUTMENT.



DAM GOOSE POND

IDENTIFICATION NO. MA 00312

LOCATION MAP
USGS QUADRANGLE

East Lee, Mass

APPROX. SCALE: 1" = 2000'

SECTION 6: STRUCTURAL STABILITY

Evaluation of Structural Stability

- a. Visual Observations - There was no visible evidence of dam instability during the site examination on 2 May 1979. However, the downstream face is relatively steep. The stone retaining wall shows evidence of local displacements and there is possible loss of ground at the right end. Evidence of seepage was noted at the base of the wall at the left end. These conditions are not considered indicative of a need for urgent remedial action. However, repairs are necessary. Furthermore, it is expected that the safety factor with respect to embankment stability may be less than convention limits.

The upstream ends of the concrete spillway side walls are tilted inward. Cracks which have occurred between the tilted and upright portions of the walls have been repaired. These walls are believed to be concrete faced stone walls and may have limited foundations. Based on the visual inspection, further tilting of the walls should be expected.

- b. Design and Construction Data - The drawings obtained from Berkshire County show the basic cross-section of the dam. However, there is no data on the engineering properties of the material in the dam, nor how it was placed. In absence of this data and in view of the relatively steep downstream face, it cannot be assumed that the safety factor for static stability of the downstream face is greater than the minimum acceptable value of 1.5 recommended by the Guidelines.
- c. Operating Records - There are no operating records for the dam other than reservoir water level readings, discharge records and State and County inspection reports.
- d. Post-Construction Changes - Modification to the crest of the dam and the spillway are recorded on a plan dated July, 1929. The plan proposes raising the crest of the dam by 18 inches and lining the spillway with concrete. Plans dated September, 1933 proposed the flattening of the dams' upstream face to a 2-1/2 horizontal to 1 vertical slope, the extension of the 20-inch outlet beyond the proposed fill, the placing of sheet piling along the upstream edge of the spillway and the filling of minor depressions at the top of the downstream slope. State inspection reports indicate that the concrete in the spillway has recently been repaired. The visual examination of the facility

Surcharge storage routing of the test flood inflow was performed, resulting in a peak outflow of 4,050 cfs at a stage of 1489.7 feet. The routed test flood outflow would overtop the dam by about 2.2 ft with a water depth of 2.7 feet at a low point on the right side of the dam crest.

f. Dam Failure Analysis - Based on Corps of Engineers Guidelines for estimating Dam Failure Hydrographs, and assuming that a failure would occur along 40 percent of the length (67 feet) of the dam structure, the peak failure outflow is estimated to be 15,800 cfs. As a result of a dam failure, Forest Street, which is about 300 ft downstream, would be overtopped together with three dirt roads and a small dam, which is used to bypass water to a power generating facility. About 7,000 feet downstream of the dam, the channel is spanned by a mill which would be severely affected by a dam failure outflow. Between the mill and the Housatonic River, a reach of about 12,500 feet, about 10 houses and another mill would also be affected, while 4 roads (including State Route 102) would be overtopped.

Based on the potential loss of life and property resulting from a failure of Goose Pond Dam, the dam is classified in the "high" hazard category.

SECTION 5: HYDRAULIC/HYDROLOGIC

1 Evaluation of Features

- a. General - Goose Pond is an earth dam located in the Town of Tyringham, Massachusetts. The dam is approximately 285 feet long with the spillway located at the left abutment of the dam. The spillway consists of a concrete lined stone masonry channel approximately 40 feet long, and 4-1/2 feet deep. The reservoir supplies water to a mill and a power generation facility located 7,000 feet and 13,500 feet respectively downstream. The pond has a water surface area of approximately 294 acres and a storage of 3,643 acre-feet at spillway crest, assumed elevation 1483.0 ft. The pond discharges to Goose Pond Brook, which conveys the flow to the Housatonic River, about 3 miles downstream. Discharge from the pond normally occurs via a 20-inch C.I. outlet pipe at the toe of the dam, with the spillway acting as an auxiliary outlet during peak discharge periods.
- b. Design Data - There is no hydraulic/hydrologic design data available for the dam, except for a reservoir stage-storage relationship chart.
- c. Experience Data - A record of Goose Pond water levels was kept for the period of March, 1935 to January, 1972. During that period the pond level has exceeded the spillway crest level three times. Normally, the pond discharges through a 20 inch pipe located at the toe of the dam with no discharge through the spillway. The maximum known flood elevation for the dam was recorded on 21 September, 1938. At that time the reservoir level reached 15 inches above the spillway crest elevation of 1483.0 ft.
- d. Visual Observations - The visual inspection of the dam and reservoir was made on 2 May, 1979. At that time the pond was 1.75 feet below spillway crest. It was noted that the spillway was of variable width (24 to 21 ft) and had no facilities for flashboards. The spillway discharge channel is stone lined, averaging 25 feet in width, and pitched on an 8 percent slope. Both the spillway and the discharge channel were in good hydrologic condition.
- e. Test Flood Analysis - Based on the Corps of Engineers Guidelines, the recommended test flood for the size (intermediate) and hazard potential (high) is the PMF (Probable Maximum Flood). The PMF was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The watershed is moderate to steeply sloped with some marsh along Cooper Brook. A peak inflow rate of 2,175 csm was adopted which results in a test flood inflow of 9,000 cfs.

SECTION 4: OPERATIONAL PROCEDURES

- 4.1 Procedures - In general, there is no formally established routine for the operation of the dam.
- 4.2 Maintenance of the Dam - The grass at the dam is cut twice a year. Repairs at the facility have been performed as a result of comments on the State Inspection Reports. Maintenance for this facility is based upon need rather than a formally established routine or procedure.
- 4.3 Maintenance of Operating Facilities - Water is released from the reservoir as needed by the downstream mill through the 20-inch C.I. pipe outlet. Maintenance of the outlet is performed on a need basis.
- 4.4 Description of Any Warning System in Effect - There is no established warning system or emergency preparedness plan in effect for this structure.
- 4.5 Evaluation - Maintenance of the facility is being performed on the basis of need. There is currently no formal operational procedures in effect for Goose Pond Dam. Formal operational procedures, maintenance programs, warning system and emergency preparedness plans should be established.

Although some of the side slopes to the pond are moderately steep, there appears to be no significant potential for landslides into the pond which would create waves that might overtop the dam. No conditions were noted that could result in a sudden increase in sediment load into the pond.

e. Downstream Channel - Goose Pond Brook, which connects Goose Pond to the Housatonic River in the Town of Lee, Massachusetts, flows on a steep gradient down a mountain notch until it is approximately 4,000 feet from the river. In the first portion of the 4,000 feet, the stream flows along the side of a U.S. highway while the last 3,000 feet to the river, it flows through a mill area.

Approximately 7,000 feet downstream of Goose Pond Dam, the water is impounded and used by a mill. Stream flow, which is not diverted at this location, is carried under the mill. Goose Pond Brook, for the major portion of its run to the Housatonic River, is a mountain brook with steep gradients, rocky channel and trees along its banks.

3.2 Evaluation - Although the present performance of the dam is apparently satisfactory, the embankment has deteriorated and is in need of repair. The downstream face is relatively steep compared to similar structures designed according to current engineering practice. Therefore, the safety margin with respect to embankment stability may not be within conventional limits.

The observed evidence of seepage and deterioration of the stone retaining wall are not considered cause for immediate concern, but changes in the pattern or amount of seepage or further movement of the stone wall could indicate the development of problems with the embankment. Furthermore, the relative steepness of the downstream face increases the potential for embankment failure in the event that adverse seepage conditions or excessive wall movements were to develop.

The spillway and outlet works, including the gatehouse, are in fair condition. Minor deterioration was observed in the spillway concrete and some stones in the masonry shaft beneath the gatehouse, and minor rusting was observed on electrical fittings within the gatehouse.

Evidence of seepage was noted: 1) at the base of the left end of the stone wall, 2) at an area midway along the berm which separates the spillway from the outlet channel, and 3) at the end of the stone-paved spillway. Some local ravelling appears to be associated with the seepage from the berm. Slight flow was observed at each area but no evidence of soil particle movement was discernible. No evidence of seepage was observed around the perimeter of the outlet pipe at the downstream toe.

c. Appurtenant Structures - A small boat was tied up at the entrance of the spillway, as shown in Photo 6. Cracks in the concrete portion of the spillway had been recently repaired. The invert concrete lining exhibits the majority of the cracking as shown in Photo 7, possibly from frost heave. While most of the repairs have been effective, some of the patches have become loose and ineffective. The spillway sidewalls upstream of the crest are tilted inward. The former crack between the tilted portion and the upright portion has also been repaired. The concrete sidewalls exhibit some top deterioration at the downstream ends. Minor debris was observed in the spillway and discharge channel, including occasional stones from the downstream paved sides slopes. Brush is present overhanging the spillway left side wall, and weeds and light brush are present between the stone paving of the discharge channel.

The gatehouse, shown in Photos 8 and 10, appeared to be adequate for its intended use. The masonry shaft down to the valve below appeared to be in good condition. Water is present for a depth of approximately 7.7 feet within the shaft as shown in Photo 9, but no motion was observed at the water surface. There is no intermediate support or bearing on the valve operator shaft although a plate and bolts present at about mid-height of the masonry shaft wall indicates that there may have been a support at one time. The equipment within the gatehouse is in operating condition but some rusting of electrical fittings was observed.

d. Reservoir Area - Goose Pond is surrounded by moderate to steeply sloped hills which are heavily forested. The shore line of the pond is developed, as shown in Photo 4, with more than 50 summer cottages present. Goose Pond Dam impounds water from two brooks, Higley Brook and Cooper Brook. Higley Brook originates at a small upstream dam and reservoir and flows into Upper Goose Pond. A narrow channel approximately 700 feet long connects Upper Goose Pond with Goose Pond. Both ponds are at the same water level under normal conditions. Cooper Brook flows from marshlands in a mountain valley and continues for most of its length through other marshy areas to Goose Pond.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General - The Phase I visual examination of Goose Pond Reservoir Dam was conducted on 2 May, 1979.

In general, the earthen embankment, spillway and gatehouse were observed to be in fair condition. The reservoir level at the time of the site examination was 1.75 feet below the weir crest.

Visual inspection checklists for the site visit are included in Appendix A and selected photographs are given in Appendix C.

b. Dam - Goose Pond Dam embankment, shown in Photos 1 and 2, is generally in fair condition. There was no evidence of settlement, lateral movement or significant erosion. Seepage was evident at the downstream toe of the dam and spillway.

The visible portion of the upstream face is sloped at about 3H to 1V. Riprap, consisting of cobbles to 12 in. boulders, extends to the crest in most areas. The riprap is locally dislodged and is mostly overgrown with grass and weeds. Riprap is mostly absent as shown by Photo 6, and some past erosion is evident near the spillway. Some local depressions were evident (possibly from removal of stumps) but no evidence of sloughing was observed.

The crest has a mowed grass cover, as shown by Photo 8. The crest elevation appears to be somewhat variable, with perhaps 0.5 ft. difference between the highest and lowest points. The crest sloped downward toward the pond with the downstream side about 1.5 ft. higher than the upstream side.

The upper portion of the downstream face is relatively steep at about 1.5H to 1V and is covered by cut grass, weeds and brush. There were some minor slope irregularities but no evidence of sloughing was observed.

The lower portion of the downstream face is formed by a dry-laid stone retaining wall, having a nominal batter of about 1H to 2V and a maximum height of about 12 ft. The top course of stones has been displaced downstream, forming an overhang. The wall appears locally unstable at the right as shown by Photo 3. Two shallow depressions were noted behind the wall in this area, indicating that there has been some lost ground. No evidence of seepage was observed at the right end of the wall.

SECTION 2: ENGINEERING DATA

- 2.1 Design Records - No design records were located for the original dam at Goose Pond. Design data in the form of plans for modifications to the dam crest and spillway dated July, 1929 and modifications to the upstream slope of the dam and spillway dated September, 1933 were located.
- 2.2 Construction Records - No records of the original construction or modifications were located.
- 2.3 Operational Records - The only operational records located were reservoir water level records, outlet discharge records, and prior inspection reports by the County and the Division of Waterways, State of Massachusetts.
- 2.4 Evaluation
 - a. Availability - The 1929 plans and the 1933 plans of the modifications to the dam were located at the Office of the County Engineer, Berkshire County, Pittsfield, Massachusetts. Records on prior County and State inspections were located at the Berkshire County Engineers' office and the Office of the Division of Waterways, State of Massachusetts, Nashua Street, Boston, Massachusetts. Reservoir water level and outlet discharge records were located at the Office of the Owner, Westfield River Paper Co., Inc., Forest Street, Lee, Massachusetts 01238.
 - b. Validity - The general features and details shown on the 1929 and 1933 modification drawings were in agreement with the features observed in the field. Minor differences noted during the site examination are that the downstream edge of the crest is elevated rather than the upstream edge, and that the riprap protection at the inlet end of the spillway is not as extensive as indicated on the plans.
 - c. Adequacy - The available data, in combination with the visual evaluation described in the following section, is adequate for the purpose of the Phase I investigation.

(5) Side slopes.....2.5H:1V U/S & 1.75H:1V D/S with dry stone masonry wall at toe

(6) Zoning.....Unknown

(7) Impervious Core.....Unknown

(8) Cutoff.....Unknown

(9) Grout Curtain.....Probably None

h. Diversion and Regulating Tunnel.....None

i. Spillway

(1) Type.....Rectangular concrete lined stone channel

(2) Length of weir.....24 ft

(3) Crest elevation.....1483

(4) Gates.....None

(5) U/S Channel.....Goose Pond

(6) D/S Channel....Stone masonry channel at 8 percent slope

j. Regulating Outlets - The regulating outlet for this structure consists of a 20-inch C.I. pipe beneath the dam. An electrically operated gate valve is operated from a gatehouse on the dam crest. The approximate invert elevation of the inlet end of the pipe is elevation 1463. The pipe discharges onto a stone channel near the toe of the dam.

(5) Full flood control pool.....	N/A
(6) Spillway crest.....	1483
(7) Design surcharge (Original Design).....	Unknown
(8) Top of dam.....	1487.5 (Nominal)
(9) Test flood design surcharge.....	1489.7

d. Reservoir

(1) Length of test flood pool.....	2.7 miles
(2) Length of normal pool.....	2.5 miles
(3) Length of flood control pool.....	N/A

e. Storage (acre-feet)

(1) Normal pool.....	3,643
(2) Flood control pool.....	N/A
(3) Spillway crest pool.....	3,643
(4) Top of dam.....	5,165
(5) Test flood pool.....	5,909

f. Reservoir Surface (acres)

(1) Normal pool.....	294
(2) Flood-control pool.....	N/A
(3) Spillway Crest.....	294
(4) Test flood pool.....	378
(5) Top of dam.....	351

g. Dam

(1) Type.....	Curved earth embankment
(2) Length.....	Approx. 285 ft
(3) Height.....	Approx. 27 ft
(4) Top Width.....	12 ft with D/S side elevated 18 inches

1. Normal Operational Procedure - The grass is cut twice a year at the dam. Water is released through the 20-inch outlet as needed by the downstream mill. Repairs to the dam are made when required. There is no formal written procedure for the operation of the dam.
- 1.3 Pertinent Data - There are no known elevations previously established at the dam site. Consequently, the water surface elevation of 1483 shown on the USGS Quadrangle, East Lee, MA, 1973, was assumed to be the spillway crest elevation. All other elevations given in this report pertaining to the dam site were estimated from the assumed spillway crest elevation.
 - a. Drainage Area - The drainage area tributary to the dam site is 4.15 square miles. The pond is surrounded by moderate to steeply sloped hills which are heavily forested. There is essentially no development in the drainage area with the exception of the shore line of Goose Pond. Goose Pond accounts for approximately 11 percent of the total drainage area.
 - b. Discharge at Dam Site - There are no records of discharges at the dam site.
 - (1) Outlet works size: 20-inch C.I. pipe, invert elev. 1463. Estimated capacity at spillway crest is 40 cfs.
 - (2) Maximum known flood at damsite.....21 September, 1938
Pond level rose 15 inches above spillway crest
 - (3) Ungated spillway capacity at top of dam
670 cfs @ 1487.5 elev.
 - (4) Ungated spillway capacity at test flood elevation
1,220 cfs @ 1489.7 elev.
 - (5) Gated spillway capacity at normal pool elevation....N/A
 - (6) Gated spillway capacity at test flood elevation.....N/A
 - (7) Total spillway capacity at test flood elevation
1,220 cfs @ 1489.7 elev.
 - (8) Total project discharge at test flood elevation
4,050 cfs @ 1489.7 elev.
 - c. Elevation (ft. above NGVD)
 - (1) Streambed at centerline of dam.....1460.5
 - (2) Test flood tailwater.....1462.9
 - (3) Upstream portal invert diversion tunnel.....N/A
 - (4) Normal pool.....1483

- d. Hazard Classification - The results of the dam failure analysis indicate that the paper mill along Forest Street, homes along Forest Street and U.S. Route 20, and the mill structure between Goose Pond Brook and the Massachusetts Turnpike Interchange would be affected by the flood wave and the potential loss of life would be more than a few persons. Consequently, the dam is classified in the "high" hazard category.
- e. Ownership - The dam is owned by the Westfield River Paper Co., Inc. a subsidiary of Simkins Industries, Inc. The owner is represented by Mr. Laurence Beckwith, Plant Manager, Forest Street, Lee, MA 01238 (Phone 413/243-0375). The prior owner, Mountain Mill Co. (a paper mfg.), sold the facilities to Westfield River Paper Co. in 1933. A 1929 plan indicates the owner at that date was Lake May Power Co.
- f. Operator - Mr. Edward Bosley, Maintenance Supervisor, is assigned responsibility for operation of the dam. His business address is Westfield River Paper Co., Forest Street, Lee, MA 01238 (Phone 413/243-0375).
- g. Purpose of the Dam - Goose Pond Dam provides for water storage and regulates its release to a downstream pond where it is used for water power and process water by a manufacturer. In addition, Goose Pond is used for recreation.
- h. Design and Construction History - The date of the actual construction of the dam is unknown. Due to the type of construction utilized, it is estimated that the dam was constructed prior to 1900. A plan dated July, 1929 by Viele, Blackwell & Buck, Engineers of 49 Wall Street in New York proposed the crest of the dam be raised approximately 18 inches to provide additional freeboard and the dry stone masonry spillway be grouted and covered with 6 inches of concrete. The invert of the spillway was to be paved with 6 inches of concrete. The existing structure indicates the modifications were made. References on this same plan to trees existing along the upstream edge to the dam crest, on the downstream face of the dam and obstructing the entrance to the spillway indicates the dam had been in existence for some time prior to 1929. A set of drawings by Samuel M. Green Company, Engineers-Architects of Springfield, MA, dated September, 1933 proposes the flattening of the dam's upstream face to a 2-1/2 horizontal to 1 vertical slope by placing additional fill and riprap, the extension of the 20-inch outlet beyond the proposed fill, the placing of sheet piling along the upstream edge of the spillway and the filling of minor depressions at the top of the downstream slope. The modifications were accomplished by 1939.

1.2 Description of Project

- a. Location - Goose Pond Dam is located on the northeast side of Goose Pond Road between McDarby Road and George Cannon Road in the Town of Tyringham, Massachusetts, as shown on the report's Location Map. The dam impounds the waters of Cooper Brook and Higley Brook to form Goose Pond. Goose Pond Brook flows from the dam to the Housatonic River, a distance of approximately 3 miles. The coordinates for the dam are 73 degrees-12.1 minutes longitude and 42 degrees-16.4 minutes latitude.
- b. Description of Dam and Appurtenances - Goose Pond Dam is an earth dam. Based on available plans, the dam is approximately 285 feet long and 27 feet high from the dam's crest to the invert of the outlet works channel. The crest of the dam is approximately 12 feet wide and sloped towards the pond approximately 18 inches. The upstream face of the dam is on a 2-1/2 horizontal to 1 vertical slope with riprap slope protection between roughly one foot above and 8 feet below spillway crest. The downstream face of the dam is irregular and vegetated but roughly on a 1-3/4 horizontal to 1 vertical slope. The lower region of the downstream face of the dam contains a dry stone masonry wall approximately on a two vertical to 1 horizontal slope except at the outlet pipe where the lower portion is vertical. The maximum height of the wall is approximately 12 feet. The design freeboard for the dam is 4-1/2 feet.

The spillway is located at the left abutment of the dam. It consists of a concrete lined stone masonry channel approximately 40 feet long, 4-1/2 feet deep and varies in width between 25 feet and 21 feet. The high point in the invert, the spillway crest, is at the original stone masonry cutoff wall for the structure. The inlet end of the spillway has riprap on each side while the spillway outlets into a stone masonry channel.

A 20-inch cast iron pipeline serves as the outlet works and reservoir drain. It passes under the dam at its maximum height. The pipe discharges onto random stones at the downstream toe of the dam. The pipeline is controlled by a gate valve in an access shaft beneath the gatehouse and operated from the gatehouse at the crest of the dam.

- c. Size Classification - The height of the dam is approximately 27 feet and the estimated total storage capacity at the top of the dam is 5,165 acre-feet. According to guidelines established by Corps of Engineers, the dam is classified in the intermediate category based on storage capacity.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

GOOSE POND DAM
MA 00312

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Camp Dresser & McKee Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Camp Dresser & McKee Inc. under a letter of 27 March 1979, from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-79-C-0053 has been assigned by the Corps of Engineers for this work. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee Inc. for the soils and geological portions of the work.

b. Purpose - The primary purpose of the investigation is to:

- (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.
- (3) Update, verify and complete the National Inventory of Dams.

indicated that, in general, the proposed modifications to the dam were accomplished. Departures from the plans observed in the field include the slope of the dam crest and the absence of riprap at the inlet end of the spillway.

- e. **Seismic Stability** - Goose Pond Dam is located in Seismic Zone No. 1 and, in accordance with recommended Phase I Guidelines, does not warrant seismic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition - Based on the results of the visual examination, the earth embankment is considered to be in fair condition. Although some repairs are needed, no conditions which would warrant urgent remedial action were noted.
- b. Adequacy of Information - The evaluation of the dam embankment has been based primarily on the visual examination, consideration of available records and past performance and application of engineering judgment. Generally, the information available or obtained was adequate for the purposes of the Phase I assessment. However, it is recommended that additional information relative to embankment stability be obtained as outlined in Section 7.2.
- c. Urgency - The recommendations for additional investigations and remedial measures, outlined in Sections 7.2. and 7.3 respectively, should be undertaken by the Owner within one year after receipt of this report by the Owner.
- d. Need for Additional Investigations - Additional investigations should be performed by the Owner as outlined in Section 7.2.

7.2 Recommendations

It is recommended that the Owner arrange for the following investigations to be undertaken by a registered professional engineer:

1. Investigate the long-term stability of the embankment, including evaluation of seepage conditions, engineering properties of embankment materials, and the need for repair or modification of the stone retaining wall and spillway side walls. Consideration should be given to the potential for and the effects of surficial slope ravelling and the effects of changes in seepage conditions.
2. A detailed hydrologic-hydraulic investigation to review the spillway adequacy and overtopping potential for the purpose of providing adequate spillway discharge capacity.
3. Evaluate potential causes and determine corrective measures necessary to effect permanent repairs in the spillway base slab and side walls.

The Owner should implement corrective measures as required, based on the above engineering evaluations.

7.3 Remedial Measures

a. **Operation and Maintenance Procedures** - The following remedial work should be undertaken by the Owner:

1. Reshape the crest to fill shallow depressions and eroded areas and provide a uniform crest elevation.
2. Restore riprap along portions of the upstream slope.
3. Stabilize ravelling of the berm between spillway and outlet channel.
4. Cut overhanging brush at the spillway and cut and remove brush and weeds from the spillway discharge channel.
5. Reset displaced stones in the spillway discharge channel.
6. Establish a formal maintenance program and operational procedures plan. Include in the program the regular cutting of weeds and grass along the downstream slope of the dam embankment, the spillway discharge channel and the berm between the spillway and outlet channels.
7. Replace intermediate support or bearing on the gate valve operator shaft.
8. Prepare an emergency preparedness plan and warning system, provide surveillance of dam during periods of heavy precipitation, and institute a program of annual technical inspections.

7.4 Alternatives - There are no practical alternatives recommended.

APPENDIX A

INSPECTION TEAM ORGANIZATION AND CHECK LIST

Page No.

VISUAL INSPECTION PARTY ORGANIZATION

A-1

VISUAL INSPECTION CHECK LIST

Embankment: Dam	A-2, A-3
Spillway	A-4
Outlet Works	A-5

VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

DAM: GOOSE POND DAM

DATE: 2 May 1979

TIME: 0930

WEATHER: Scattered clouds 60° F moderate breeze.

WATER SURFACE ELEVATION UPSTREAM: 1'-9" below weir crest

STREAM FLOW: Approximately 40 cfs

INSPECTION PARTY:

1. Roger H. Wood - CDM
2. Joseph E. Downing - CDM
3. Douglas G. Gifford - H&A
4. John Critchfield - H&A
5. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Dam</u>	<u>D. Gifford</u>	
2. <u>Spillway</u>	<u>R. Wood</u>	<u>Pond surface below spillway</u>
3. <u>Outlet Structure</u>	<u>R. Wood</u>	<u>Operating</u>
4. _____		

PRESENT DURING INSPECTION:

1. Employee of Westfield River Paper Co. - Part-time
2. _____
3. _____

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: GOOSE POND DAM

DATE: 2 MAY 1979

EMBANKMENT: DAM

BY: JWC & DGG

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	1. a. Cut grass growing between riprap stones. Occ. brush stumps. b. Some local depressions (\pm 0.5 ft. deep). No apparent sloughing. c. Riprap (cobbles to 12 in. boulders), overgrown & locally dislodged, extends to crest most areas. Riprap virtually absent on slope within \pm 50 ft. of spillway. d. None observed.
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Movement or Settlement	2.
3. Downstream Slope a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains	3. a. Cut grass. b. Some minor erosion near spillway. c. None observed. d. None apparent.
4. General a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems	4. a. Cut grass & weeds, occ. brush stumps. b. Two depressions (\pm 0.5 ft. deep by \pm 8 ft. long) behind right end of stone wall, apparent lost ground. Local raveling of berm which separates spillway from D/S channel. c. None observed. d. None observed. e. Top course of stone wall displaced \pm 1 ft. D/S, creating overhang. Some stones dislodged. Wall appears bowed out & locally unstable at right end in area of slope depressions. f. Clear seepage noted 1) at base of slope wall at left end, 2) from berm between spillway & D/S channel and 3) at end of stone-paved spillway. Each location flowing \pm 1 gpm. No apparent scil movement. g. None observed. h., i. None known.
	4. a. Local displacement of stone wall.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: GOOSE POND DAM

DATE: 2 MAY 1979

EMBANKMENT: DAM (cont'd)

BY: JWC & DGG

CHECK LIST	CONDITION
<p>1. Upstream Slope</p> <ul style="list-style-type: none"> a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows <p>2. Crest</p> <ul style="list-style-type: none"> a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Movement or Settlement <p>3. Downstream Slope</p> <ul style="list-style-type: none"> a. Vegetation b. Sloughing or Erosion c. Surface Cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains <p>4. General</p> <ul style="list-style-type: none"> a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems 	<p>4.</p> <ul style="list-style-type: none"> b. D/S side crest generally about 5.9 ft. above water (est. varies \pm 0.5 ft.). U/S about 1.5 ft. lower. c. Crest curved, about 12 to 13 ft. wide. d. Abutment conditions good. Local displacement of rock spillway side wall. e. None observed. f. Frequent, unrestricted. g. None known.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: GOOSE POND DAM

DATE: 2 MAY 1979

SPILLWAY:

BY: R. WOOD

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc. d. Other	1. a. Good. b. Boat tied at entrance. c. None. d. Riprap transition good.
2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids Or Erosion i. Visible Reinforcement j. General Struct. Condition k. Other	2. a. None. b. None. c. Overhanging brush left wall, minor weed in slab D/S of weir. d. None observed. e. None observed. f. Base slab U/S of weir cracked and recently repaired. g. OK. h. Recently repaired - minor deterioration top D/S end of both side walls. i. None observed. j. Good both side walls U/S of weir have tilted inward slightly. k. Minor debris in channel, brush etc.
3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Struct. Condition	3. a. See 2 above. b. None. c. Paved with rubble stone masonry - good. d. Grass & weeds present. e. None observed. f. See d plus few stones from side slopes. g. Good - side slopes paved with rubble stone masonry on 1:1+ slope. Few stones are displaced.
4. Walls a. Wall Location (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct. Condition	4. See 1, 2 & 3.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: GOOSE POND DAM

DATE 2 MAY 1979

OUTLET WORKS:

BY: R. WOOD

CHECK LIST	CONDITION
1. Inlet <ul style="list-style-type: none"> a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates 	1. Intake under water at U/S toe of dam - not visible.
2. Control Facility <ul style="list-style-type: none"> a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks 	2. <ul style="list-style-type: none"> a. Wooden structure on brick shaft. Brick in good condition. Wooden superstructure in fair condition. Pipe rungs in shaft appear to be in good condition. b. None observed. c. None observed. d. Gate operational and maintained. e. Buried, not observable. f. 7.7' of water in shaft. No water motion observed.
3. Outlet <ul style="list-style-type: none"> a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks 	3. <ul style="list-style-type: none"> a. 20" CI pipe outlets through an inclined stone wall on top of a vertical stone wall. b. Turbulence too great to observe. c. None observed. d. Not able to report due to spray from discharging pipe.
4. Mechanical and Electrical <ul style="list-style-type: none"> a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection 	4. <ul style="list-style-type: none"> a. None. b. None. c. Electric powered gate operator good condition. d. None observed. Would take a while to convert to manual operation. e. Operational - Some minor rusting of boxes. f. Cable guy from adjacent pole. Outlet pipe has ground damp from underground conduit.
5. Other	

APPENDIX B

LIST OF AVAILABLE DOCUMENTS AND
PRIOR INSPECTION REPORTS

DOCUMENTS

Page No.

List of Available Documents
Description of Dam, District 1, Mass. Div. of
Waterways, January 12, 1973

B-1

B-2

PRIOR INSPECTION REPORTS

Date By

Page No.

August 13, 1969 Berkshire County
May 11, 1971 Mass. Dept. of Public Works
January 17, 1973 Mass. Dept. of Public Works
November 11, 1974 Mass. Dept. of Public Works
October 7, 1976 Mass. Dept. of Public Works
August 22, 1978 Mass. Dept. of Public Works

B-6

B-7

B-8

B-11

B-14

B-17

DRAWINGS

No.

Title

Page No.

1 Goose Pond Reservoir by Viele,
 Blackwell & Buck Engineers,
 July 15, 1929.

B-20

2 1393 - 1 thru 4 - Goose Pond Dam
 (Plan & Sections) by Samuel M. Green
 Co., August 31, 1933 to September 6,
 1933.

B-21 to B-24

LIST OF DOCUMENTS

GOOSE POND DAM

<u>DOCUMENT</u>	<u>LOCATION</u>
1. Description of Dam, District 1, Mass. Dept. of Public Works. January 17, 1973.	Division of Waterways, Department of Environmental Quality Engineering Nashua Street, Boston, MA
2. Goose Pond Reservoir, Plans and Sections, by Viele, Blackwell & Buck Engineers. July 15, 1929.	Berkshire County Engineering Office, County Courthouse Pittsfield, MA
3. Dwg 1393 - 1 thru 4, Goose Pond Dam, Plans and Sections, by Samuel M. Green Co. August 31, 1933 to September 6, 1933.	Berkshire County Engineering Office, County Courthouse Pittsfield, MA

DESCRIPTION OF DAM

DISTRICT ONE.Submitted by RDJordanDam No. 1-2-301-1Date 1-17-73City/Town TynghamName of Dam Goose Pond1. Location: Topo Sheet No. 5-C.

Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: _____ Year/s of subsequent repairs _____

3. Purpose of Dam: Water Supply _____ Recreational _____
Irrigation _____ Other manufacturing _____4. Drainage Area: 4.5 sq. mi. _____ acres.5. Normal Pending Area: 246 Acres; Ave. Depth _____.
Impoundment: _____ gals; _____ acre ft.6. No. and type of dwellings located adjacent to pond or reservoir _____
i.e. summer homes etc. _____7. Dimensions of Dam: Length 340' Max. Height 20'.
Slopes: Upstream Face earth 3:1.
Downstream Face earth 1½:1.
Width across top 10'.8. Classification of Dam by Material:
Earth _____ Conc. Masonry _____ Stone Masonry _____.
Timber _____ Rockfill _____ Other _____.9. A. Description of present land usage downstream of dam:
50 % rural; 50 % urban.
B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure
Yes . No .

L-169 A

DAM NO. 1-2-302-1.

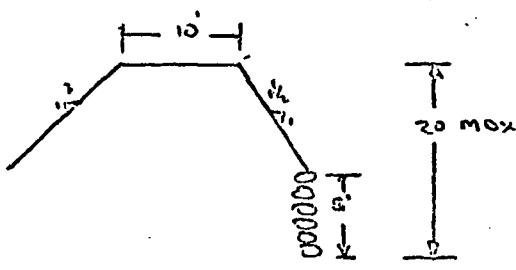
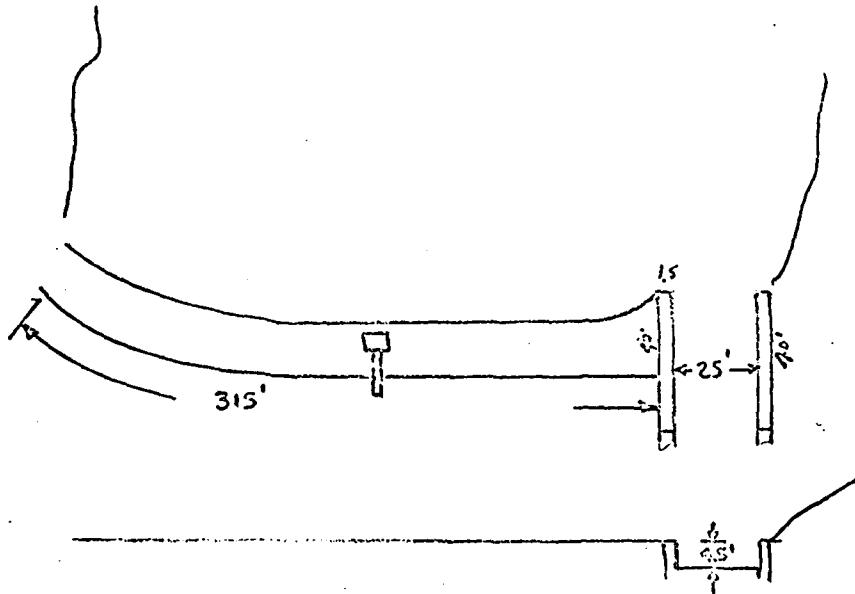
10. Risk to life and property in event of complete failure.

No. of people _____ A FAILURE COULD DESTROY MOST OF
No. of homes _____ EAST LEE.
No. of Businesses 3 _____
No. of Industries 1 _____ Type _____
No. of Utilities _____ Type _____
Railroads _____
Other dams Diversion _____
Other Forest Street - Route 20

11. Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

APPENDIX B-3

LEOOL POND
1-2-302-1



APPENDIX B-4

L-168-A

DAM NO. 1-2-301-1

8. Downstream Face of Dam:

Condition: 1. Good _____ 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 10' above _____ below _____

top of dam _____

principal spillway _____

other _____

11. Summary of Deficiencies Noted:

Growth (Trees & Brush) on Embankment _____
 Animal Burrows and Washouts _____
 Damage to slopes or top of dam _____
 Cracked or damaged masonry _____
 Evidence of seepage _____
 Evidence of piping _____
 Erosion _____
 Leaks _____
 Trash and/or debris impeding flow _____
 Clogged or blocked spillway _____
 Other _____

L-168

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town TYINGHAM Dam No. 1-2-301-1
Name of Dam Goone Pond Inspected by PDJordan - MBraniol
Date of Inspection 8-22-78
Previous Inspection 10-7-76

2. Owner/s per: Assessors _____
Reg.of Deeds _____ Personal Contact _____
1. Westfield River Paper Co., Inc. Lee, MA
None St. & No. City/Town/State Tel. No.
2. Name St. & No. City/Town /State Tel No.

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name _____ St. & No. _____ City/Town /State _____ Tel.No. _____

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor 2 Moderate _____
3. Severe _____ 4. Disastrous X

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual X
Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good Y 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

12. Remarks & Recommendations: [Fully Explain] PREVIOUS INSPECTION DATE: November 11, 1974

There is no change in the condition of this dam, the following deficiencies were noted.
(Reported in 1974.)

Brush growing in back of the spillway chute walls.

A crack in the southerly chute wall.

Light brush and weeds on the embankment.

Except for these minor deficiencies, the dam appears to be safe.

For location see Topo Sheet 5-C.

13. Overall Condition:

1. Safe X
2. Minor repairs needed
3. Conditionally safe - major repairs needed
4. Unsafe
5. Reservoir impoundment no longer exists [explain]

Recommend removal from inspection list _____

Downstream Face of Dam: Condition: 1. Good _____. 2. Minor Repairs _____.
3. Major Repairs _____. 4. Urgent Repairs _____.

Comments: _____

9. Emergency Spillway: Condition: 1. Good _____. 2. Minor Repairs _____.
3. Major Repairs _____. 4. Urgent Repairs _____.

Comments: _____

10. Water level @ time of inspection: 6' _____. ft. above _____. below _____.
top of dam _____.
principal spillway _____.
other _____

11. Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment _____.

Animal Burrows and Washouts _____.

Damage to slopes or top of dam _____.

Cracked or Damaged Masonry _____.

Evidence of Seepage _____.

Evidence of Piping _____.

Erosion _____.

Leaks _____.

Trash and/or debris impeding flow _____.

Clogged or blocked spillway _____.

Other _____.

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town TYRINGTON Dam No. 1-2-302-1.
 Name of Dam Coose Pond. Inspected by: RDJordan-RDSpaniol.
 Date of Inspection 10-7-76.

2. Owner/s: per: Assessors . Prev. Inspection X.
 Reg. of Deeds . Pers. Contact .

1. Westfield River Paper Co., Lee, MA
 Name St. & No. City/Town State Tel. No.
 2. Name St. & No. City/Town State Tel. No.
 3. Name St. & No. City/Town State Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.
 Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken 1.

5. Degree of Hazard: [if dam should fail completely]*
 1. Minor . 2. Moderate .
 3. Severe . 4. Disastrous X.

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic . Manual X .
 Operative X yes: no: .

Comments:

Upstream Face of Dam: Condition:
 1. Good . 2. Minor Repairs X.
 3. Major Repairs . 4. Urgent Repairs .

Comments:

12. Remarks & Recommendations: [Fully Explain]

PREVIOUS INSPECTION D/T: 1/17/73

Both slopes have growths or light brush and weeds. The condition is minor, but should be removed.

The concrete emergency spillway is in good condition, however, the spillway chute walls need some repair. The brush growing at the back of each wall should be removed. A large crack in the southerly wall should be sealed.

The downstream slope shows no signs of sloughing and appears to be stable. No leaks or seepage was noted at the toe. Except for the minor deficiencies noted, the dam appears to be safe.

For location see Topo Sheet 5-C.

13. Overall Condition:

1. Safe
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists [explain]
Recommend removal from inspection list _____

L 169 A

- 2 -

DAM NO. 1-2-302-1

8.

Downstream Face of Dam: Condition: 1. Good x. 2. Minor Repairs ____.
3. Major Repairs ____ 4. Urgent Repairs ____.

Comments: Brush

9.

Emergency Spillway: Condition: 1. Good _____. 2. Minor Repairs x _____.
3. Major Repairs _____. 4. Urgent Repairs _____.
Comments: cracks in sidewall
brush on top of walls

10.

Water level @ time of inspection: 6. ft. above _____. below x _____.
top of dam _____.
principal spillway _____.
other normal _____.

11.

Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment x _____.
Animal Burrows and Washouts _____.
Damage to slopes or top of dam _____.
Cracked or Damaged Masonry x _____.
Evidence of Seepage _____.
Evidence of Piping _____.
Erosion _____.
Leaks _____.
Trash and/or debris impeding flow _____.
Clogged or blocked spillway _____.
Other _____.

12. Remarks & Recommendations: [Fully Explain]

The gate was open for the winter drawdown at the date of this inspection. The embankment and slopes appear to be in good condition, there is no sloughing or settlement. There is no evidence of any seepage at the toe. Both slopes are well cleared and mowed. The concrete masonry at the emergency spillway is in good repair.

Visually, the dam is structurally sound.

13. Overall Condition:

1. Safe
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists [explain]

Recommend removal from inspection list _____

L-1E8 A

- 2 -

DAM NO. 1-2-302-1

8.

Downstream Face of Dam: Condition: 1. Good X. 2. Minor Repairs _____.
3. Major Repairs _____. 4. Urgent Repairs _____.

Comments: _____

9.

Emergency Spillway: Condition: 1. Good X. 2. Minor Repairs _____.
3. Major Repairs _____. 4. Urgent Repairs _____.

Comments: _____

10.

Water level @ time of inspection: 8+ ft. above _____. below X _____.
top of dam X _____.
principal spillway _____.
other _____.

11.

Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment _____ none _____.
Animal Burrows and Washouts _____ " _____.
Damage to slopes or top of dam _____ " _____.
Cracked or Damaged Masonry _____ " _____.
Evidence of Seepage _____ " _____.
Evidence of Piping _____ " _____.
Erosion _____ " _____.
Leaks _____ " _____.
Trash and/or debris impeding flow _____ " _____.
Clogged or blocked spillway _____ " _____.
Other _____ " _____.

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town Tyringham Dam No. 1-2-302-1
 Name of Dam Goose Pond Inspected by: RDJordan
 Date of Inspection X 1-17-73

2. Owner/s: per: Assessors _____
 Reg. of Deeds _____ Pers. Contact _____
 1. Westfield River Paper Co. Lee, MA 243-0375
 Name St. & No. City/Town State Tel. No.
 2. _____
 Name St. & No. City/Town State Tel. No.
 3. _____
 Name St. & No. City/Town State Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.
 Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken 3.

5. Degree of Hazard: [if dam should fail completely]*
 1. Minor _____ 2. Moderate _____
 3. Severe _____ 4. Disastrous X
 *This rating may change as land use changes [future development]

6. Outlet Control: Automatic _____ Manual X
 Operative X yes: _____ no: _____
 Comments: _____

7. Upstream Face of Dam: Condition:
 1. Good X 2. Minor Repairs _____
 3. Major Repairs _____ 4. Urgent Repairs _____
 Comments: _____

INSPECTION OF DAMS

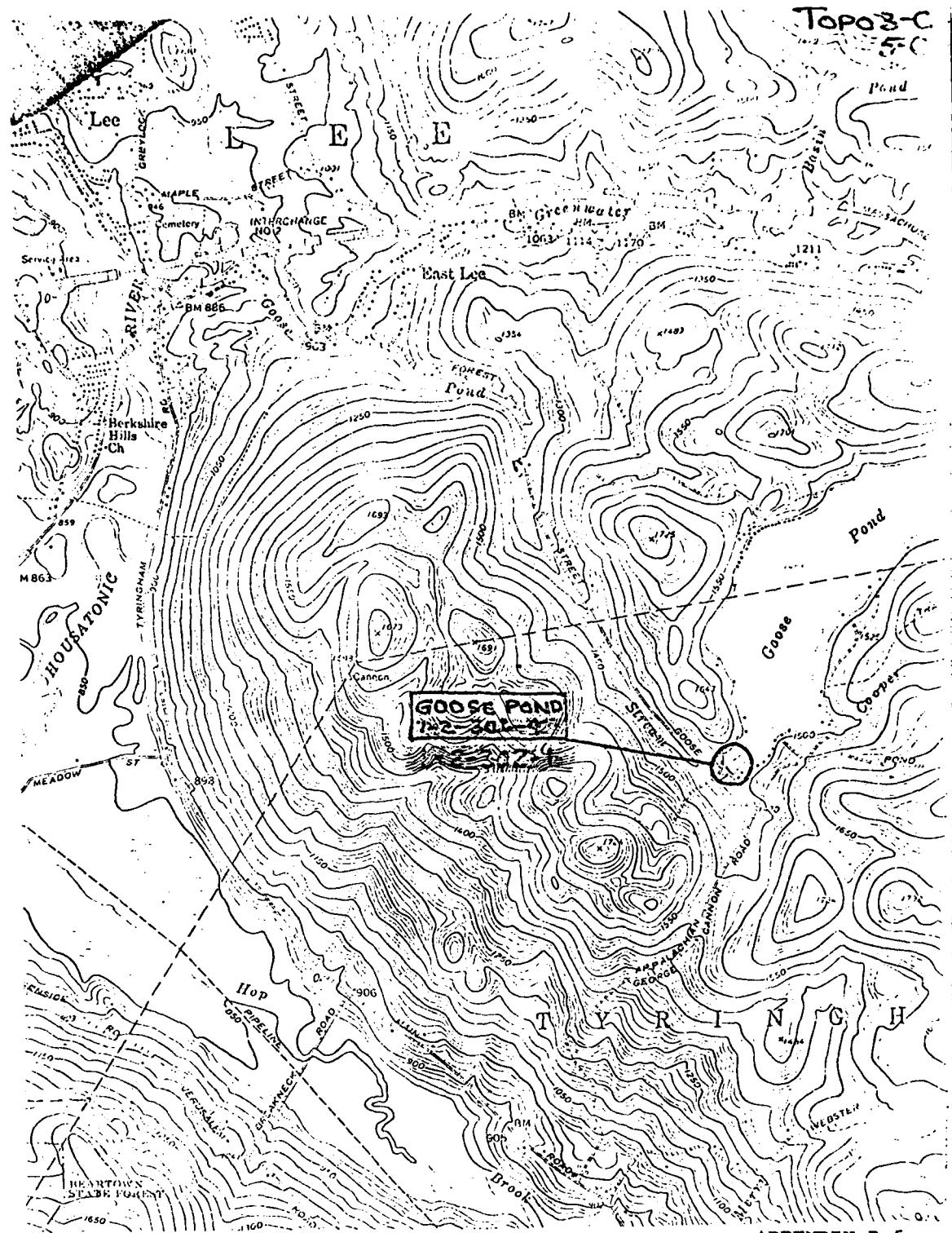
City or Town of Tyngsborough Date May 11, 1971Name of Dam Goose Pond Inspector R. NorthrupOwner Westfield River Paper Company Address Lee, Mass.Caretaker Westfield River Paper Company Address Lee, Mass.Location At Goose Pond on Forest Street.Type of Dimensions Earth embankment, dry stone wall downstream, 250' long, 30' high.Spillway, type and size Stone masonry 22' wide, 4' freeboard.Outlets, type and size 18" pipe and gateFlashboards, type and height NoneDate Built _____ Condition GoodWhen last repaired 1939 By whose orders Owners - County Comm.Nature of Repairs Spillway channel rebuilt.Purpose of Dam Manufacturing and recreationApproximate storage of water 216 acresApproximate area of water shed 4.5 square milesPossible damage due to failure of dam Disastrous to life and property below.Remarks Water 3' below spillway. Gate open. Growth in spillway and some cracks.Apparently used for storage by cabin as a boat and other items are in spillway inlet.Recommendations Clean and patch spillway as needed.Corrective Action.

COUNTY OF BERKSHIRE, MASS.
INSPECTION OF DAMS

City or Town of Tyringham Date August 13, 1969
 Name of Dam Goose Pond Inspector William A. Heaphy
 Owner Westfield River Paper Company Address Lee, Mass. Tel. 243-0375
 Caretaker J. Willey Address Lee, Mass. Tel. 243-0375
 Location Goose Pond - near Lee Town Line
 Type and Dimensions Earth embankment - dry stone wall downstream -
250' long - 20' high
 Spillway, type and size Stone masonry - 22' wide - 4' freeboard
 Outlets, type and size 18" Cast iron pipe and gate
 Flashboards, type and height None
 Date Built ? Condition Good - see remarks
 When last repaired 1939 By whose orders Owners and County Commissioners
 Nature of Repairs Spillway channel rebuilt

 Purpose of Dam Manufacturing and power
 Approximate storage of water 246 acres - Lee - 139 acres - Tyringham - 107 acres
 Approximate area of water shed 4.5 square miles
 Possible damage due to failure of dam Disastrous to life and property below

 Remarks Water level about 4.5' below spillway. Gate partially open. Cutting of grass and brush has commenced. Top in good condition. Some portions of slopes need cutting.
Rubbish and growth in spillway floor and downstream of spillway. Spillway sidewalls are cracked.
 Recommendations Remove growth as necessary. Check spillway sidewalls and repair as necessary.



APPENDIX B-5

- 3 -

12. Remarks & Recommendations; (Fully Explain)

Considerable repairs have been completed on the spillway. All the cracks and spalls have been sealed, and it is now in good condition.

A heavy growth of brush and weeds is growing on the downstream face and adjacent to the spillway.

Except of the noted deficiencies the dam appears to be in good condition.

For location see Topo Sheet 5-C.

13. Overall Condition:

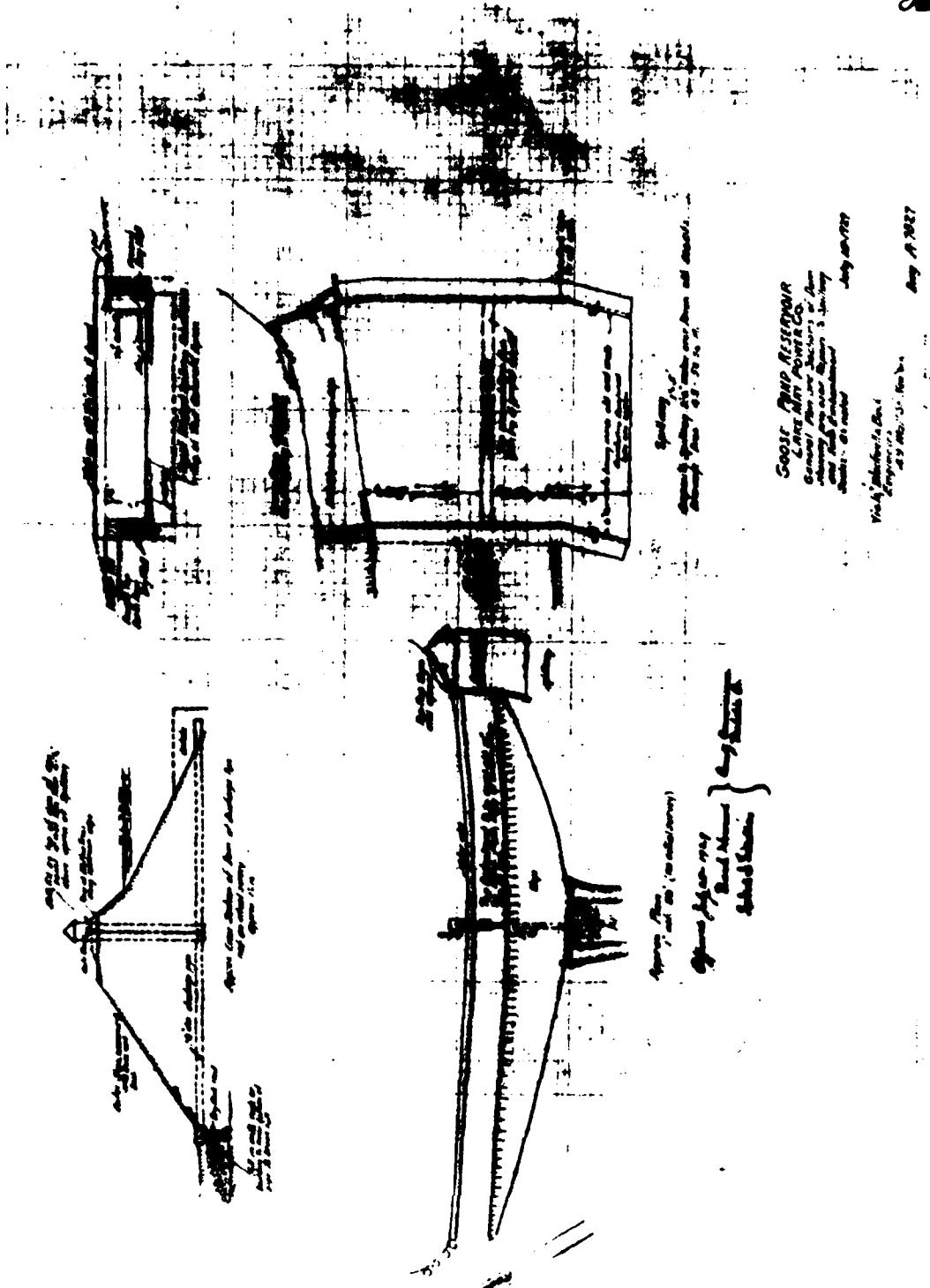
1. Safe _____

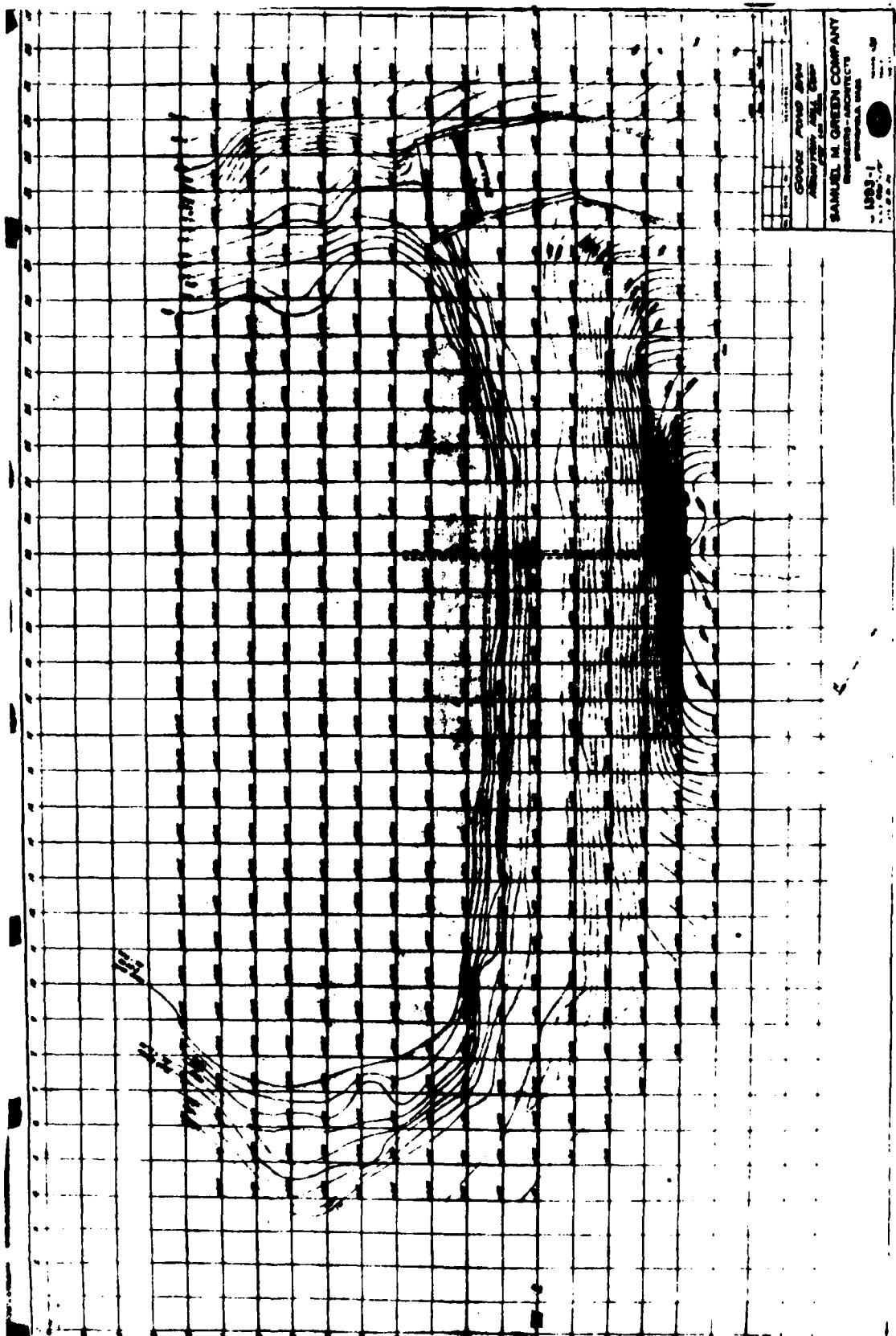
2. Minor repairs needed _____

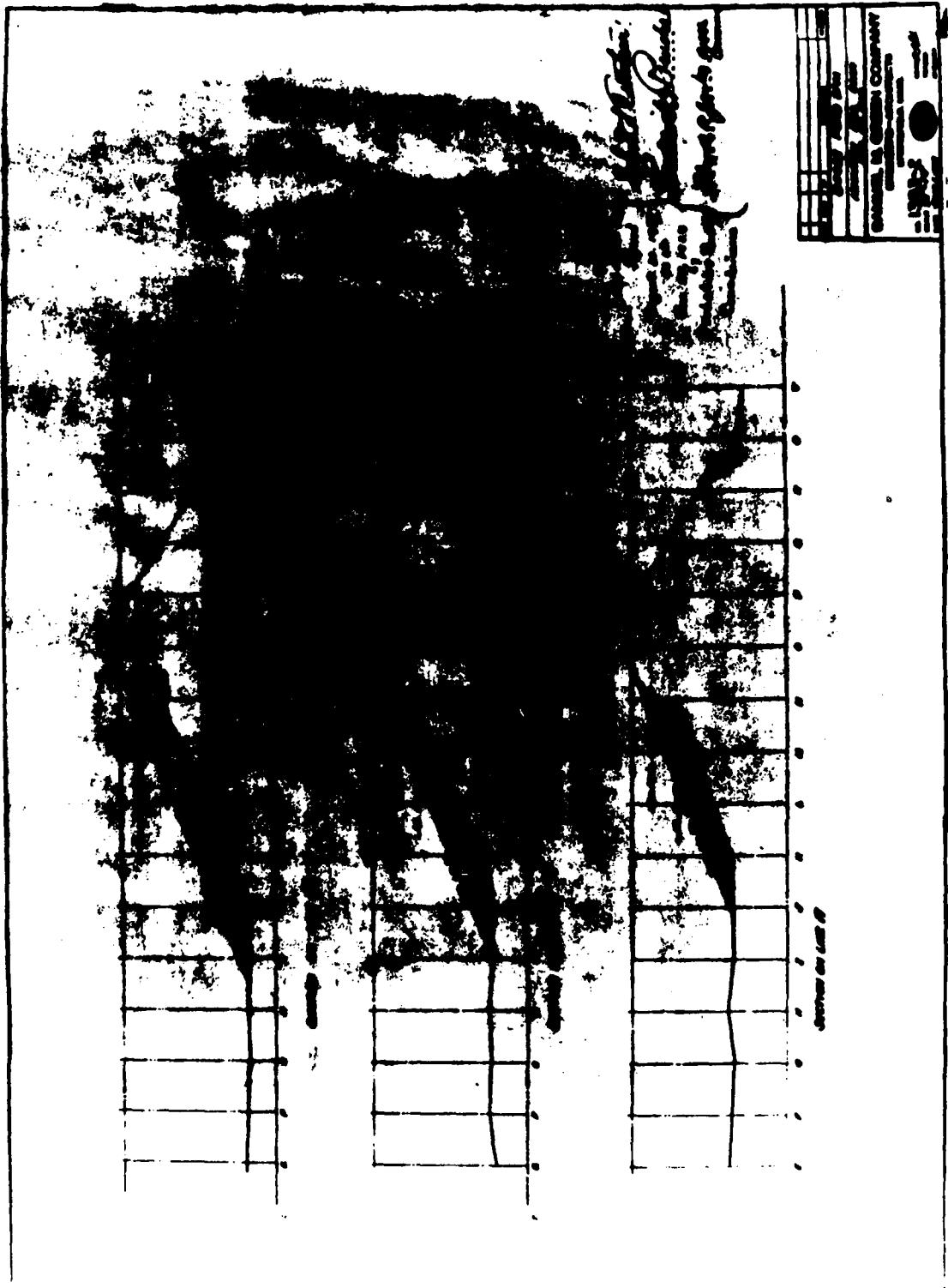
3. Conditionally safe - major repairs needed _____

4. Unsafe _____

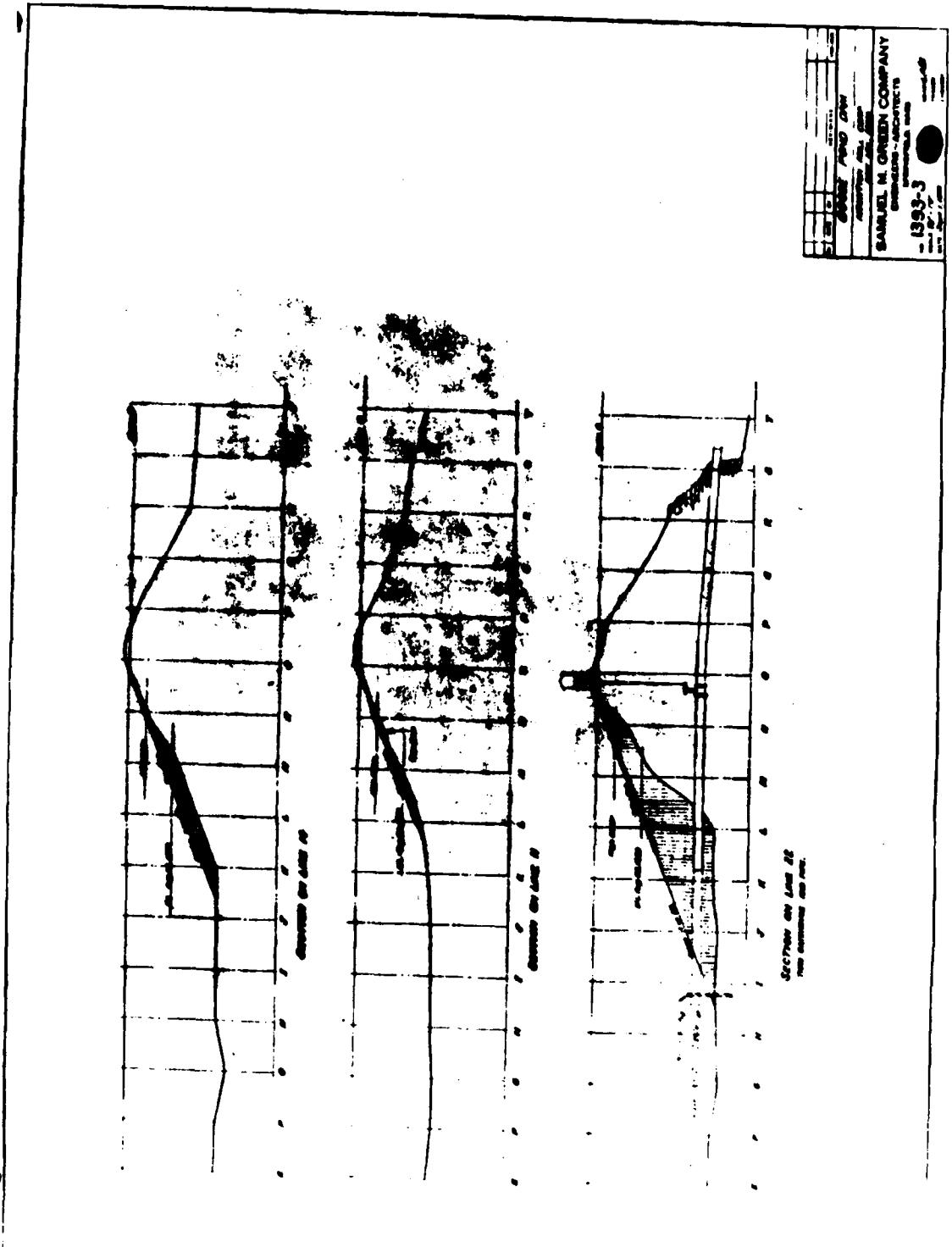
5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list _____



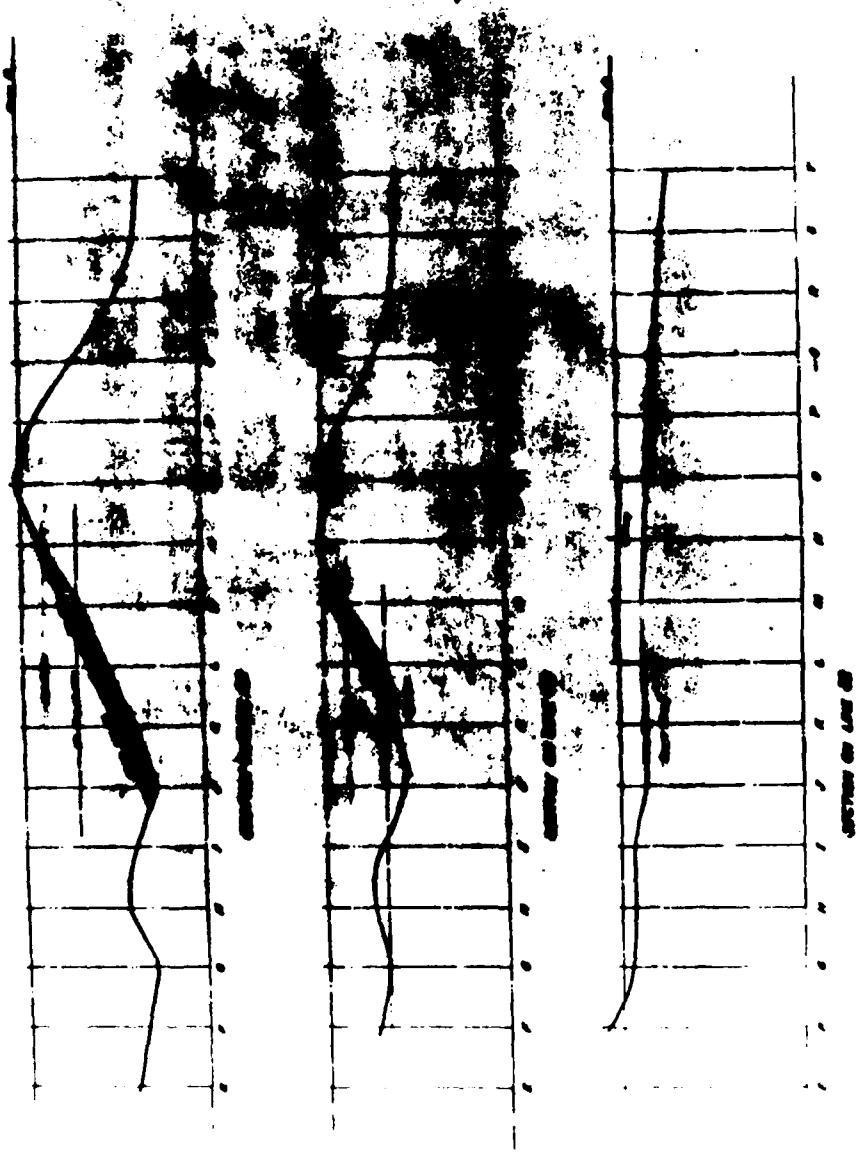
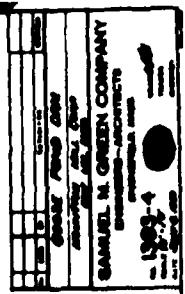




APPENDIX B-22



APPENDIX B-23



APPENDIX C

SELECTED PHOTOGRAPHS OF PROJECT

Page No.

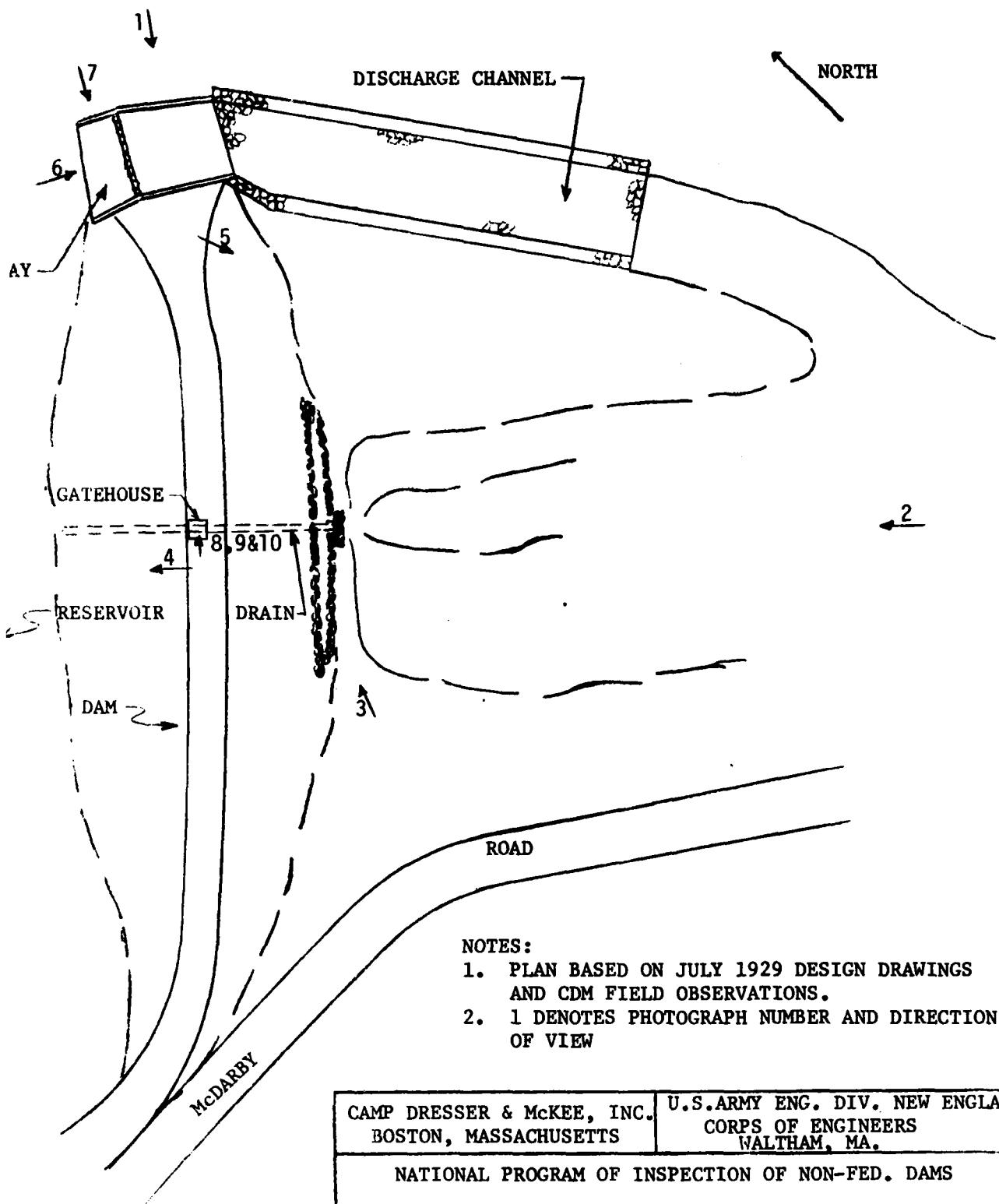
LOCATION PLAN

Location of Photographs

C-1

PHOTOGRAPHS

<u>No.</u>	<u>Title</u>	<u>Page No.</u>
1.	Overview of Dam From Left Abutment	iv
2.	Downstream Face of Dam and Outlet Discharge Channel	C-2
3.	Inclined Stone Masonry Wall and Outlet Pipe at Toe of Dam	C-2
4.	View of Pond Shoreline From Dam	C-3
5.	View of Downstream Outlet Discharge Channel From Dam	C-3
6.	Spillway Entrance	C-4
7.	Spillway Base Slab and Right Side Wall	C-4
8.	Gatehouse and Powerline Pole on Dam Crest	C-5
9.	Access Shaft Beneath Gatehouse	C-5
10.	Interior of Gatehouse	C-6



NOTES:

1. PLAN BASED ON JULY 1929 DESIGN DRAWINGS AND CDM FIELD OBSERVATIONS.
2. 1 DENOTES PHOTOGRAPH NUMBER AND DIRECTION OF VIEW

CAMP DRESSER & MCKEE, INC. BOSTON, MASSACHUSETTS	U.S. ARMY ENG. DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.
---	---

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION OF PHOTOGRAPHS

GOOSE POND

MASSACHUSETTS

Scale: Not To Scale

Date: June 1979

APPENDIX C-1



2. DOWNSTREAM FACE OF DAM AND OUTLET DISCHARGE CHANNEL.



3. INCLINED STONE MASONRY WALL AND OUTLET PIPE AT TOE OF DAM.



4. VIEW OF POND SHORELINE FROM DAM. DAM RIPRAP IN FOREGROUND.



5. VIEW OF DOWNSTREAM OUTLET DISCHARGE CHANNEL FROM DAM. STEEPLY DISCHARGE CHANNEL RIGHT EMBANKMENT IS AT THE RIGHT SIDE OF THE PICTURE.



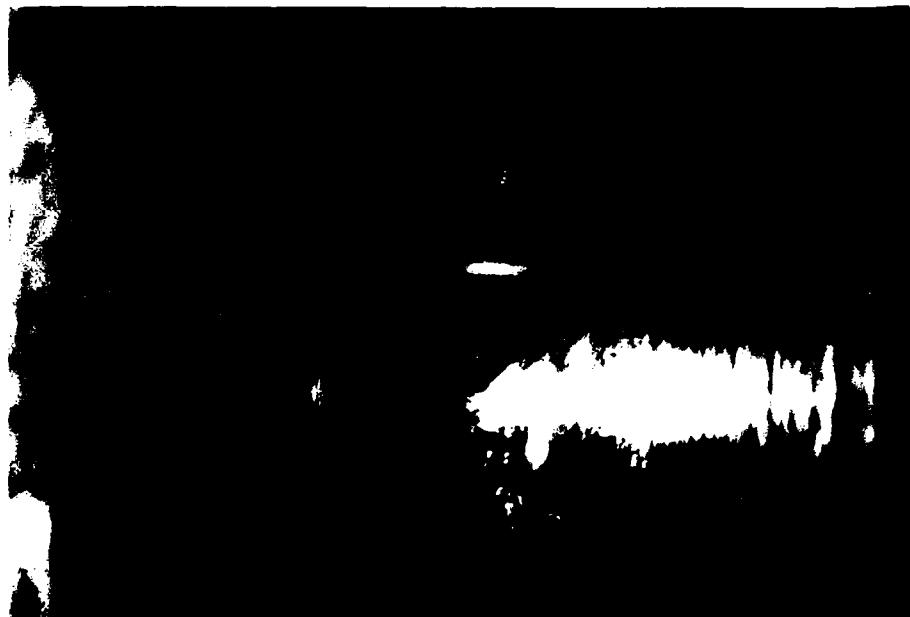
6. SPILLWAY ENTRANCE. NOTE BOAT AND VEGETATED APPROACH.



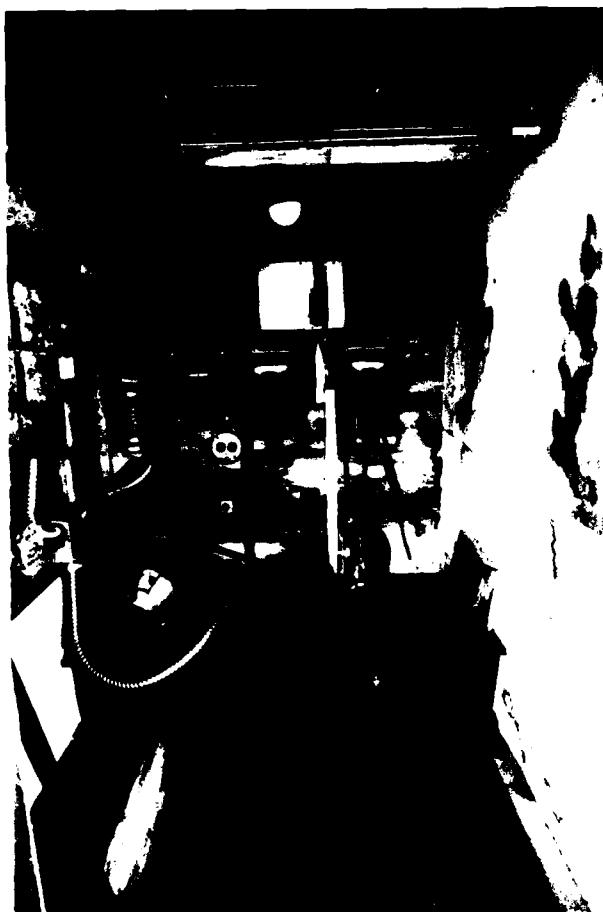
7. SPILLWAY BASE SLAB AND RIGHT SIDE WALL. NOTE RECENT CONCRETE REPAIRS.



8. GATEHOUSE AND POWERLINE POLE ON DAM CREST.



9. ACCESS SHAFT BENEATH GATEHOUSE. NOTE UNSUPPORTED VALVE
SHAFT, BUILT-IN RUNGS AND WATER IN INVERT.



10. INTERIOR OF GATEHOUSE

APPENDIX D

MAPS AND HYDRAULIC/HYDROLOGIC COMPUTATIONS

Page No.

DRAINAGE AREA AND DAM FAILURE IMPACT AREA MAP D-1

COMPUTATIONS

Drainage Area; Water Surface Areas	D-2
Elevations; Surface Areas; Storage Volumes;	
Size Classification; Hazard Classification	D-3
Test Flood Determination; Stage-Discharge Relationship	D-4
Surcharge Storage Routing	D-7
Tailwater Analysis	D-8
Dam Failure Analysis	D-9

NUMBER	MA 312	NED	MA 003 01	GOOSE POND DAM	4216.4	7312.1	31MAY79			
POPULAR NAME				NAME OF IMPOUNDMENT						
GOOSE POND				GOOSE POND						
④	⑤	⑥	⑦	⑧	⑨	⑩	⑪			
REGION/STATE	RIVER OR STREAM			NEAREST DOWNSTREAM CITY - TOWN - VILLAGE			DIST FROM DAM (MIL.)	POPULATION		
01 07	HIGLEY + COOPE + BROOKS			TYRINGHAM			0	330		
⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳		
TYPE OF DAM	YEAR COMPLETED	PURPOSES		STORAGE HEIGHT		IMPOUNDING CAPACITIES		NAVIGATION LOCKS		
REP/C	1900	HSR		27	27	5165	3643	DIST	OWN	
⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	
REMARKS										
22 - PRIOR TO 1900										
⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	
DISCHARGE HAS	SPILLWAY LENGTH	MAXIMUM WIDTH	TYPE	VOLUME OF DAM (CIV)	POWER CAPACITY		NAVIGATION LOCKS			
CHESN	CHESN	CHESN	CHESN	CHESN	INSTALLED	PROPOSED	NO. LENGTH (FT.)	NO. LENGTH (FT.)	NO. LENGTH (FT.)	
1	285	U	23	670						
⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	
CONSTRUCTION BY										
OWNER				SAMUEL H GHEE, CO						
⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	
REGULATORY AGENCY	CONSTRUCTION			OPERATION			MAINTENANCE			
DESIGN	CONSTRUCTION			OPERATION			MAINTENANCE			
NONE	NONE			NONE			NONE			
⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	⑳	
INSPECTION BY				INSPECTION DATE		AUTHORITY FOR INSPECTION				
				DAY	MO	YR				
CAMP DRESSER + MCKEE INC				02MAY79		PUBLIC LAW 92-367				
REMARKS										
⑳										
47 MODIFICATIONS										

APPENDIX E
INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

CAMP DRESSER & MCKEE INC

CLIENT Corps of Engineers
PROJECT Dam Inspection
DETAIL Geographic Area

JOB NO 3806-RT-9
DATE CHECKED 7/18/79
CHECKED BY JED

PAGE 12
DATE 5-11-79
COMPUTED BY be A

Reach 4 Tyringham Road to Housatonic River
Length = 920 ft.

Beyond Tyringham Rd the flow will spread out into sheet flow and discharge into the Housatonic River.

Route 102 will be overtopped and one to two homes will be affected.

CLIENT Corps of Engineers JOB NO 380-6-RT-9 PAGE 11
 PROJECT Dam Inspection DATE CHECKED 7/10/79
 DETAIL Goose Pond Dam CHECKED BY AD DATE 5-11-79
 COMPUTED BY Joe P.

Reach 3 - Power Plant Dam to Tyrinham Road;
length = 1,500 ft.

About 3000ft downstream of the Power Plant Dam, there is a Mill spanning the brook above its natural channel. The first flood crosses just above the natural channel creating a constricted outflow under the mill. The Operator mentioned previous ponding of water at the upstream face of the mill during past major floods. The Mill is a wooden structure dating back some time. Just upstream of where Goose Pond Brook and Greenwater Brook confluence, there is an abandoned road which crosses the brook above a formed concrete culvert 12'4" x 9.5'4". The area of opening is about 110 ft². Roadway is about 1.5 feet above the crown of 11.0' and 4".

In the event of a dam failure, at least the portion of the Mill which spans the brook would be washed away. The concrete culvert under the abandoned road will undoubtedly be washed away due to its present state of deterioration and structural instability.

At Tyrinham Road there is a small culvert so the road will be overtapped.

The slopes in this reach vary. Near Tyrinham Rd it is about 1-2 percent. It increases to about 6% in the mid region of the reach, and then decreases to 3% just downstream of the Power Plant Dam.

Q for the reach \approx 15,300 cfs, Assume the flow contributed by Greenwater Brook to be negligible.

Based on trapezoidal cross-sections, the depth of water in the overbanks would vary from 7 feet around Tyrinham Rd to 5 feet around the Mill Bldg, Bres.

In addition to the Mill, 8 homes and 1 industrial building will be affected. Two of the eight homes are very close to the channel and may be totally destroyed.

CAMP DREIBER & MCKEE INC.

CLIENT Corps of Engineers JOB NO 300-6-RT-9
PROJECT Dam Inspection DATE CHECKED 7-18-79
DETAIL Geese Pond Dam CHECKED BY JED

PAGE 10
DATE 5-11-79
COMPUTED BY Joe H.



Reach Location Map
USGS Quad: East Lee, MASS

2000 1000 0 2000 ft

scale

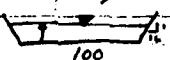
CLIENT Corps of Engineers JOB NO 300-6-RT-9 PAGE 9
 PROJECT Dam Inspection DATE CHECKED 7/10/79
 DETAIL Goose Pond Dam CHECKED BY DD DATE 5-11-79
 COMPUTED BY Joe A.

Reach 2 - Forest Street to Power Plant dam:
 Length = 4000 ft.

Three dirt roads cross Goose Pond Brook within this reach. One is about 200 feet from the Forest Street culvert and has a 6' x 9' steel culvert. About 1200 ft further downstream, there is a covered bridge with no abutments crossing the stream's natural channel. And 1200 feet further down another private road exists with a 7' x 9' steel culvert with crown at the top of road. In the event of a dam failure each of the three roads described above would be washed away.

About 9000 ft from the Forest Street culvert, there is a small dam which would also wash away in the event of a dam failure. The dam is about 15 ft long and 10 ft high. Its purpose is to assure a water supply to a 30" steel penstock which feeds a power plant about 1.5 miles downstream. Excess water overflows the spillway and runs down Goose Pond Brook. The Power Plant is located at the intersection of Rt. 20 and Forest Street.

The slope of the reach is about one percent.

The approx section geometry = 

Based on such a geometry the depth of water would be about 7.5 feet.

The covered bridge and the dam will be affected by the dam failure flow in reach 2.

Due to the shallow slope of the reach, some storage would be expected. Route flow through the reach.

The pond storage w/ water surface elev. @ Crest of Dam

Storage in the reach = $4900 \text{ ft} (100 \text{ ft} + 16 \times 7.5) 7.5 = 167 \text{ ac-ft.}$

$$Q_{out} = 15,800 \left(1 - \frac{167}{5,165}\right) = 15,289 \text{ cfs} \text{ say } 15,300 \text{ cfs}$$

since the storage is such a small percentage of the pond storage, no iteration is necessary.

CAMP DRESSER & MCKEE INC.

CLIENT Corps of Engineers
PROJECT Dam Inspection
DETAIL Goose Pond DamJOB NO 380-6-RT-9
DATE CHECKED 7/10/79
CHECKED BY JEDPAGE 8
DATE 5-11-79
COMPUTED BY Joe H.

DAM FAILURE ANALYSIS

Determine Dam Failure Flow, Q_f:

$$Q_f = \frac{g}{2g} (W_b) (g)^{1/2} (V)^{3/2} \text{ where } W_b = \text{Max. of 90\% of the dam's width measured at mid-height.}$$

$$= 168 \times 0.9 = 67 \text{ ft}$$

$$g = 32.2 \text{ ft/sec}^2$$

$$V = \text{height of dam} = 27 \text{ ft}$$

$$Q_f = \frac{g}{2g} (67) (32.2)^{1/2} (27)^{1.5}$$

$$= 15,800 \text{ cfs}$$

Reach 1 - Goose Pond Dam to Forest Street; length \approx 300ft.

The slope of the reach is about 8 percent. A 5' steel culvert crosses under Forest St. with roadway about one foot above the crown of pipe. Overbank elevations are just slightly lower than the road. Due to slope and reach geometry, no storage exists within the reach. The existing culvert cannot carry the flow; water will overtop the road at a depth of about 4-feet based

overbank depth upstream of Forest Street

$\frac{4}{100} \text{ ft}$ approx. channel configuration

$$15,800 \text{ cfs} = \frac{1.49}{n} A R^{0.5} S^{1/2}$$

$$= \frac{1.49}{0.098} \frac{(100+2y)y}{300+2y} \left(\frac{(100+2y)y}{300+2y} \right)^{1/2} (0.08)^{1/2}$$

$$y = 5 \text{ to } 5.5 \text{ ft. } \approx \text{overbank depth}$$

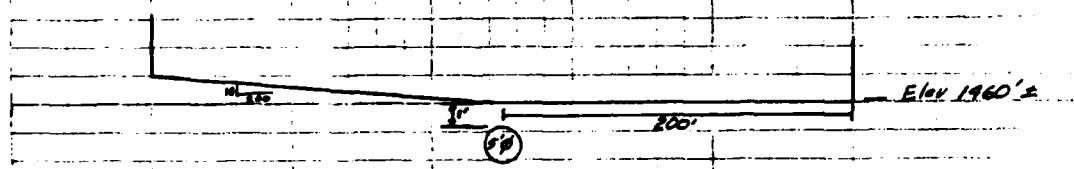
No structures would be affected in this reach.

CAMP DRESSER & MOORE INC. CLIENT COE JOB NO 380-6-RT-9 PAGE 7
 PROJECT Dam Inst. DATE CHECKED 7/18/79 DATE 5-11-79
 DETAIL Goose Pond Dam CHECKED BY JED COMPUTED BY Jack H.

TAILWATER ANALYSIS

The routed Test Flood = 4,050 cfs. Such an outflow would be expected to overtop Forest Street downstream but discharge at the pond should not be affected.

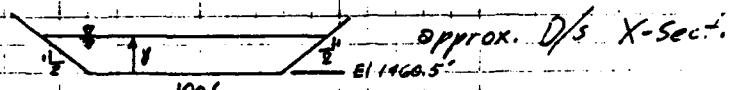
Check Water Surface Elevation at Forest Street, based on the following X-section:



W.S.E.L.	Flow through Culvert (cfs)	Flow through Water (cfs)	Total Flow cfs
1965	300	11,600	11,900

If spillway crest elevation is 1983', dam crest el. 1987.5 and total outflow from pond is approx 9,050 cfs, then tailwater will not affect pond discharge for the PMF occurrence.

Determine Test Flood Tailwater elevation:



Approx W.S.E.L.	Flow	$Q = \frac{1.99}{0.095} (100+2y) y \left(\frac{100+2y}{100+2y+5} \right)^{2/3} (0.0$
1962.3	3,790	
1962.5	4,359	

• Tailwater el. \approx 1962.9'
 @ a tailwater elevation of 1962.9', no tailwater effects will occur

CAMP DRESSER & MCKEE INC. CLIENT COE JOB NO 380-G-RT-9 PAGE 6
 PROJECT Dam Ins. DATE CHECKED 7/10/79 DATE 5-11-74
 DETAIL Gravel Pond Dam CHECKED BY ED COMPUTED BY Joe H.

SURCHARGE STORAGE ROUTING

Test Flood, $Q_p = 9000 \text{ cfs}$ (see page for Test Flood Determination)

Surcharge Height to pass Q_p is 1991.75 ft

$$\text{STOR}_1 = \frac{\text{Surcharge Storage}}{\text{Drainage Area}} = \frac{3050 \text{ ac-ft} \times 12 \text{ ft}}{2658} = 13.77 \text{ inches}$$

$$\text{Probable Max. Flood: } Q_{p_1} = Q_p \left(1 - \frac{\text{STOR}_1}{19}\right) = 9000 \left(1 - \frac{13.77}{19}\right) = 2477 \text{ cfs}$$

Surcharge Height to pass Q_{p_1} is El. 1988.95'

$$\text{STOR}_2 = \frac{3020 \times 12}{2658} = 9.12 \text{ inches}$$

$$\text{STOR AVG} = \frac{13.77 + 9.12}{2} = 11.44 \text{ inches}$$

$$Q_{p_2} = 9,000 \left(1 - \frac{11.44}{19}\right) = 3,581 \text{ cfs}$$

Surcharge Height to pass Q_{p_2} is El. 1989.5'

Related STOR = $\frac{2100 \times 12}{2658} = 9.98 \text{ inches}$ which is < STOR AVG

Let $9.98'' = \text{STOR}_3$ and compute a new STOR AVG and determine Q_{p_3}

$$\text{New STOR AVG} = \frac{11.44 + 9.98}{2} = 10.46 \text{ inches}$$

$$Q_{p_3} = 9,000 \left(1 - \frac{10.46}{19}\right) = 4,045 \text{ say } 4,050 \text{ cfs}$$

Surcharge Height to pass Q_{p_3} is Elev. 1989.7'

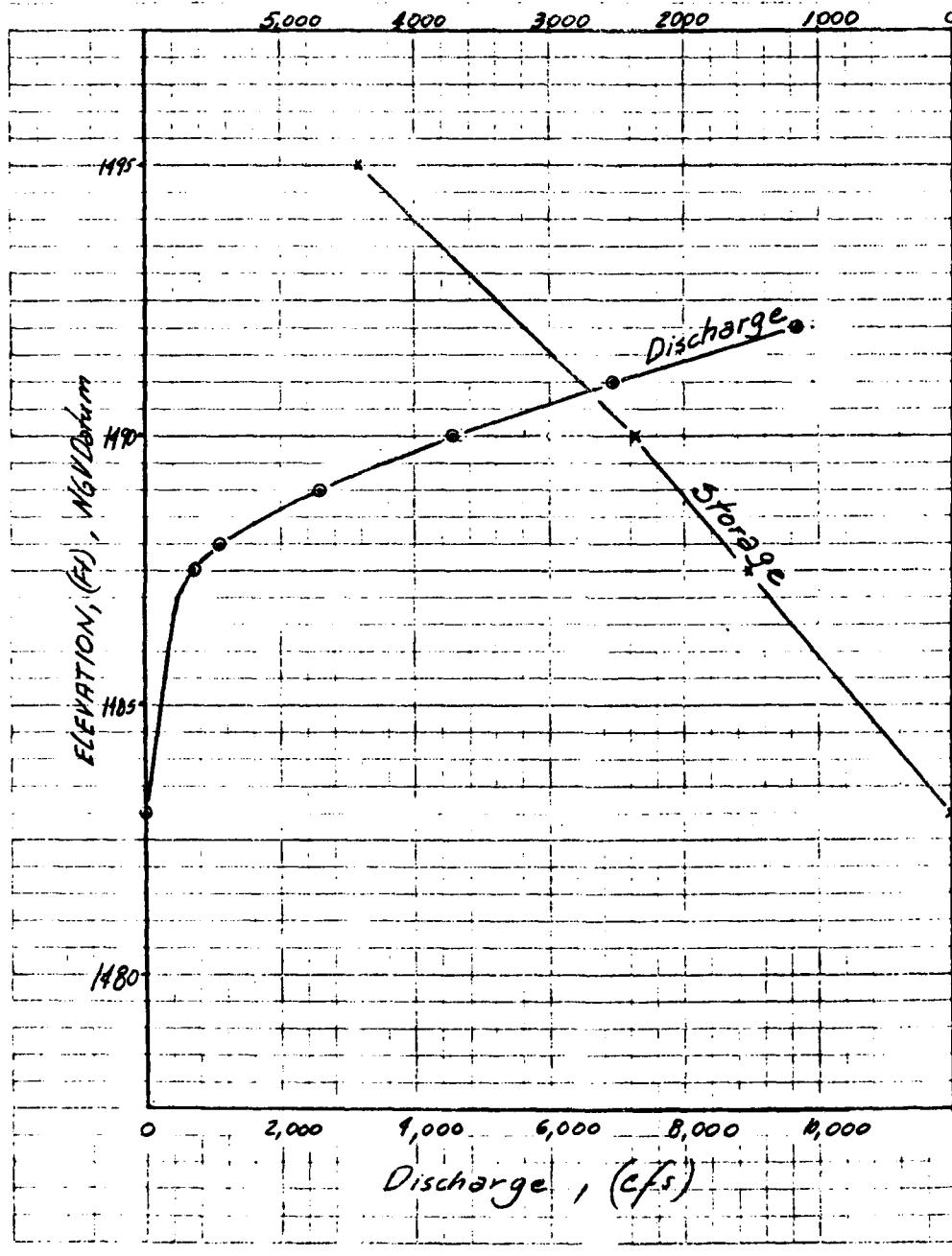
Routed Test Flood $\approx 4,050 \text{ cfs}$

The dam would be generally overtopped by 2.2 feet. The depth of water through a low area on the crest of the dam would be about 2.7 feet.

CAMP DRESSER & MCGEE INC.

CLIENT COE
PROJECT Dear Tarp
DETAIL Goose Pond DamJOB NO 310-6-07-9
DATE CHECKED 7/10/79
CHECKED BY JEDPAGE 5
DATE 5-11-79
COMPUTED BY Joe A.

Storage Above Spillway Crest



CAMP DRESSER & MCKEE INC. CLIENT COE JOB NO 180-6-RT-9 PAGE 4
PROJECT Dam Test DATE CHECKED 3/10/79 DATE 5-11-79
DETAIL Georg Pend Dam CHECKED BY JED COMPUTED BY Joe A.

Stage - Discharge Relationship

W.S. El.	Spillway Discharge (Q _s)	Right Embankment QRI	Total Discharge (Q _T)	
1483.0	-	-	ZERO	
1487.5	673	-	673	
1488.0	788	258	31	1,077
1489.0	1,036	1,343	159	2,533
1490.0	1,305	2,883	332	4,526
1491.0	1,595	4,785	550	6,930
1492.0	1,903	6,976	802	9,681

CAMP DRESSER & MCKEE INC. CLIENT COE JOB NO 380-6-RT-9 PAGE 7
 PROJECT Dem. Insp. DATE CHECKED 7/19/79 DATE 5-11-79
 DETAIL Geese Pond Dam CHECKED BY EDD COMPUTED BY Joe A.

ELEVATIONS

Spillway Crest	1983.0
Crest of Dam	1987.5
Toe of Dam	1960.5

Reference Elevation is 1927 National Vertical Datum.

SURFACE AREAS

Elv. 1983; 299.3 acres \approx 0.460 sq. miles
1990; 382.0 acres \approx 0.596 sq. miles
1500; 437.5 acres \approx 0.689 sq. miles

Drainage area \approx 2658.0 acres \approx 4.153 sq. miles

STORAGE VOLUMES

According to the Operator's records, @ el. 1987.5 Storage = 5,165 ac-ft
 Elevation 1987.5 is equivalent to top of dam

@ Spillway Crest Eleu. (1983.0), Storage = $5,165 - \frac{(299.3 + 382)}{2} \times 1.5 = 3,643$ ac-ft

@ Elevation 1990, Storage = $5,165 + (382 \times 2.5) = 6,010$ ac-ft

@ Eleu 1500, Storage = $6,010 + \frac{(382 + 437.5)}{2} \times 10 = 10,107$ ac-ft

SIZE CLASSIFICATION

Hydraulic Height \approx 27 ft \therefore Small

Storage at Crest of Dam \approx 5,165 ac-ft \therefore Intermediate

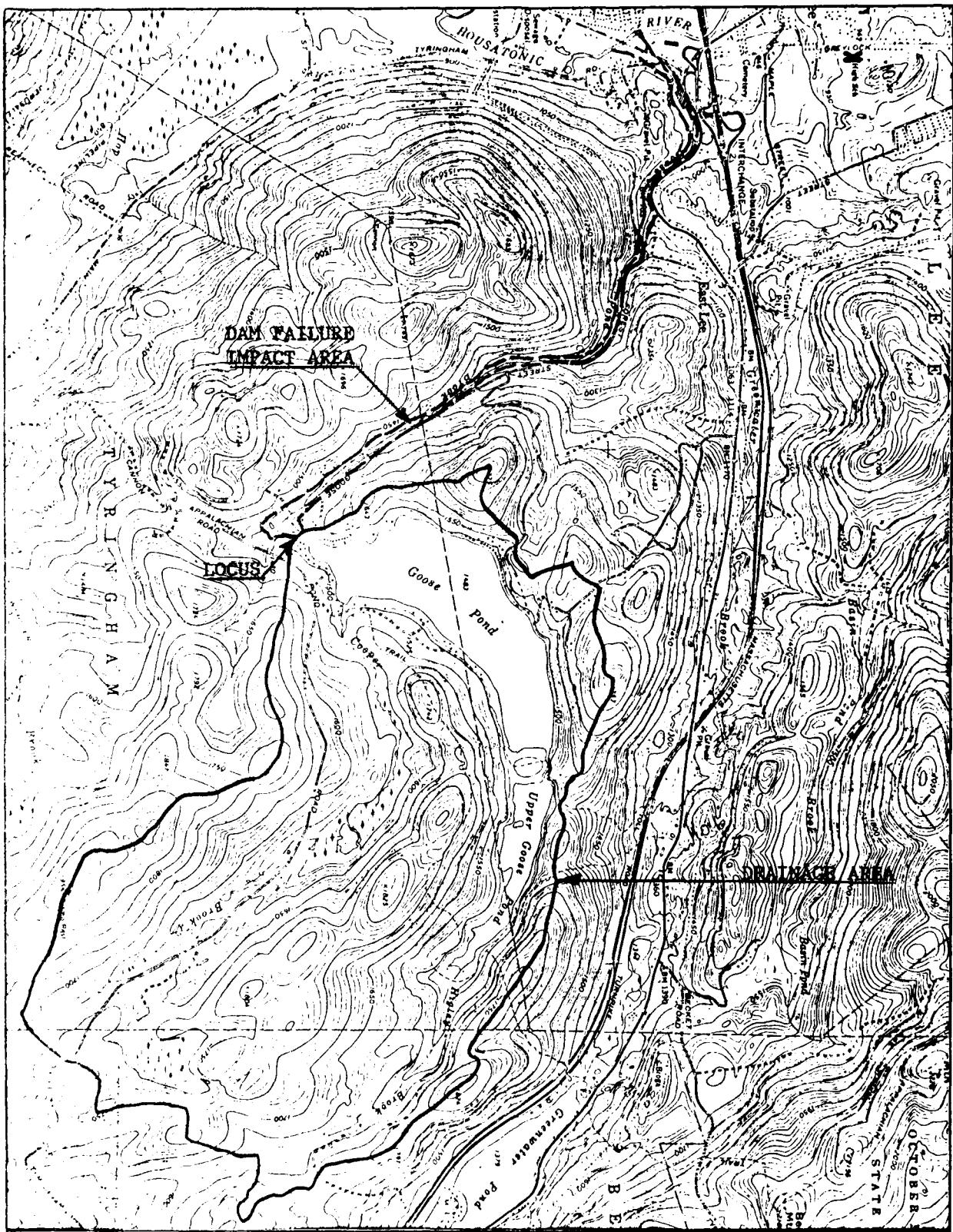
HAZARD CLASSIFICATION

The dam failure analysis (pages 8-12) indicates that ten dwellings and two mills would be affected.

\therefore Hazard is HIGH

CAMP DRESSER & MCKEE CLIENT 380-6-RT-9 PAGE 1
 Environmental Engineers DATE CHECKED 5-7-79
 Boston, Mass. CHECKED BY Joe A. COMPUTED BY CPM

<u>UPPER GOOSE POND</u>	
	SCALE OF MAPPING = 1" = 2000' $sq\text{ in} \times 91.83 = " \text{ ACRES (A)}$
	$A = 640 = " \text{ mi}^2$
	<u>DRAINAGE AREA</u>
1.	28.90 $28.945 \text{ acre} = 28.945 \text{ sq in} = 265 \text{ B.O.A.} = 4.153 \text{ mi}^2$
2.	28.99
	<u>WATER SURFACES</u>
	<u>GOOSE POND</u>
	<u>EL 1483</u>
1.	2.57 $2.59 \text{ acre} = 2.59 \text{ sq in} = 237.84 = 0.372 \text{ mi}^2$
2.	2.61
	<u>UPPER GOOSE POND</u>
	<u>EL 1483</u>
1.	0.64 $0.615 \text{ acre} = 0.615 \text{ sq in} = 56.5 \text{ A} = 0.088 \text{ mi}^2$
2.	0.59
	<u>GOOSE POND</u>
	<u>EL 1490</u>
1.	3.14 $3.16 \text{ acre} = 3.16 \text{ sq in} = 290.2 \text{ A} = 0.453 \text{ mi}^2$
2.	3.18
	<u>UPPER GOOSE POND</u>
	<u>EL 1490</u>
1.	0.98 $1.00 \text{ acre} = 100 \text{ sq in} = 91.84 = 0.143 \text{ mi}^2$
2.	1.02
	<u>GOOSE POND</u>
	<u>EL 1500</u>
1.	3.45 $3.485 \text{ acre} = 3.485 \text{ sq in} = 320.0 \text{ A} = 0.500 \text{ mi}^2$
2.	3.52
	<u>UPPER GOOSE POND</u>
	<u>EL 1500</u>
1.	1.31 $1.295 \text{ acre} = 117.5 \text{ A} = 0.184 \text{ mi}^2$
2.	1.28



DAM #1 GOOSE POND

IDENTIFICATION NO. MA 00312



DRAINAGE AREA AND DAM FAILURE
IMPACT AREA MAP

APPROX. SCALE: 1" = 3075'

APPENDIX D-1

END

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